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CENSUS OF THE BRITISH ISLES, 1871.
BIRTHPLACES AND MIGRATION.*

MIGRATION.

THE Census Returns afford some interesting information on the subject of migration, which we will now consider. We have already seen that out of 31,370,622 persons born in the British Isles, and enumerated on the day of the census, no less than 30,173,391 resided within the kingdom of their birth (see Table, p. 174). Amongst every hundred native Englishmen enumerated there were 99·29 who resided in England; amongst every hundred Scotch there were 92·88 who resided in Scotland, and amongst every hundred Irishmen 87·20 who resided in Ireland. The Irish, therefore, are the most migratory people of the three kingdoms, and if we bear in mind that they furnish at the same time by far the largest contingent of trans-oceanic emigrants, we may safely assume that, whatever decrease may have occurred in the population of Ireland, there is no decrease in the number of Irishmen.

But if we add to this migration between the three kingdoms, likewise that which is going on from county to county within the limits of each, the Irish will be found to be second to the Scotch and English as a migratory race. In 1871, 23,017,878 persons resided within the county in which they were born, and 8,352,744 elsewhere. The natives of each of the four great divisions of the British Isles contributed towards this number in the following proportions:—

Natives of	Number.	Per Centage of Natives of each Division.
England and Wales	5,963,057	27·28
Scotland	980,929	29·75
Ireland	1,380,436	22·69
Man and Channel Islands	28,322	20·32
British Isles...	8,352,744	26·62

In other words, amongst every hundred natives of England enumerated throughout the British Isles, there were 27·28 who resided beyond the county in which they were born, whilst the proportion of Scotch and Irish similarly situated was 29·75 and 22·69 respectively. The Scotch consequently hold the first rank, the Irish come last.

Again, looking at each kingdom separately, the English are the most migratory, for out of every hundred natives of England enumerated within the limits of that kingdom, no less than 26·96 resided beyond the county of their birth, whilst this proportion for Scotland was 24·4 per cent., for Ireland, 11·3 per cent., and for Man and the Channel Islands only 1·8 per cent.* This is only what might have been expected from the large extent of England, its higher industrial and commercial development, and greater facilities for travel. Migration within the limits of Ireland is strikingly small. There is no mistaking the fact, however, that it tends towards the east coast, and overflows in the direction of the great manufacturing districts of England and Scotland.†

Unfortunately, the Census Returns do not enable us to trace the natives of each county throughout the British Islands. We are told, for instance, how many natives of Scotland resided in England, but not the counties from which they came. The statements which follow, and the conclusions we draw from them, are therefore necessarily confined to migration within the limits of each kingdom, and each of our Migration Maps must be treated as four separate maps printed, for the sake of convenience, upon the same sheet of paper. This deficiency of information does not very much affect Scotland and England, as the natives of these two who reside beyond the limits of the kingdom of their birth are comparatively few; but it materially affects Ireland, whose migration has been directed principally to the sister kingdoms.

A glance at our Migration Maps, as well as their careful comparison with the maps exhibiting the Local Element of the population, will show at once that there exist vast and striking differences within the limits of the United Kingdom as regards the extent of migration. There are counties which have retained nearly the whole of their native population, others from which a broad stream of emigration has proceeded, compensated for, in every instance, by a counter-current of immigration. Of the natives of

* See Table in Appendix, column 7.

† See Migration Maps, and Map showing the distribution of the Irish Element in Great Britain.

* Our readers are requested to substitute the following Table for that inserted at the bottom of p. 175:—

	Entire Counties.	Rural Parts of Counties		Entire Counties.	Rural Parts of Counties.
Shetland	97·5	97·6	Pembroke ...	86·3	86·3
Orkney	93·4	93·4	Fife	86·3	84·0
Cornwall	91·2	91·9	Suffolk	85·4	86·3
Cardigan	90·9	90·9	Lincoln	85·1	85·7
Norfolk	89·8	90·0			
Ross and Cromarty	89·4	89·4	Peebles	52·2	54·4
Anglesey	89·1	89·1	Dumbarton ...	47·3	47·2
Caithness	88·6	88·6	Middlesex (extra-Metrop.) ...	41·6	41·6
Sutherland ...	86·4	86·4	Selkirk	37·4	39·5
Carmarthen ...	86·3	86·3			

On the map showing the Local Element, Norfolk (rural) should be tinted medium blue, Haddington and Berwick yellow; on p. 175, second column, line 22 from top, 68·90 should be substituted for 69·47.

Lancashire and the Shetlands less than ten per cent. are to be met with in other parts of England and Scotland, whilst more than half the natives of Peebles and Kinross had established themselves beyond the boundaries of the counties in which they were born. These are the extremes, and between them all graduations will be found to exist in apparently inextricable confusion. It will be our task to bring something of order into this chaos.

We will, first of all, divide the counties into two great classes; the first including all those counties the migration from which exceeds the average existing throughout the kingdom in which they are situated; the second class are those in which the migration is less than the average.*

Each of these classes we subdivide again according to whether the Local Element of their population is above or below the average existing throughout the kingdom in which they are situated.†

We thus have the following four divisions, which are represented graphically on the map marked V.:—

1. Migration and Local Element below average (10 counties).

2. Migration below, Local Element above average (46 counties and Isle of Man).

3. Migration and Local Element above average (43 counties).

4. Migration above, Local Element below average (19 counties and Channel Isles).

The total population of the following counties is greater than the number of natives of these counties enumerated in 1871 as residing within the kingdom of their birth :—

London, Surrey (ex.-Metrop.), Sussex, Hants, Middlesex (ex.-Metrop.), Stafford, Warwick, Cheshire, Lancashire, Yorkshire, Durham, Northumberland, Monmouth, Glamorgan, Carnarvon, Merioneth.

Aberdeen, Bute, Dumbarton, Edinburgh, Elgin, Forfar, Kirkcudbright, Lanark, Linlithgow, Renfrew, Selkirk.

Dublin, Kildare, King's, Louth, Cork, Limerick, Waterford, Antrim, Down, Londonderry, Mayo.

These are the counties which have attracted the largest number of immigrants, whilst those, the population of which is less than that of the number of persons born in them, as enumerated in 1871, may appropriately be described as counties of dispersion, which send a large number of emigrants to other counties without receiving a similar number of immigrants in return.

LAWS OF MIGRATION.—TOWNS.

We have now presented our readers with the leading facts bearing upon the birthplaces and the migrations of the people, but should deem our task but half accomplished were we not to make some attempt at discovering the laws, or rather the rules, which govern migration. There cannot be the least doubt that the centres of industry and commerce increase at a more rapid rate than the districts in which agricultural pursuits predominate. Map VI. shows this very clearly. Lancashire, Yorkshire, Durham, and the Metropolitan counties in England, Lanark and Renfrew in Scotland, and Belfast in Ireland, are tinted there so as to indicate an increase of population far above that taking place, on an average throughout the country.* It is to these districts that migration is chiefly directed. They abound in large towns, whose population increases generally at a more rapid rate than that of the surrounding country, and a consideration of the constituent elements of their population with special reference to migration will fitly precede what we shall have to say with reference to entire counties and their rural portions.

Where a town increases more rapidly in population than the country at large, we may generally assume that this increase is due, in a large measure, to immigration. The immigrants may either flock into the town from the immediate neighbourhood, or they may come from a considerable distance. The latter appears to be the case in newly settled countries. New York, for instance, has increased very rapidly in population, not so much because the inhabitants of the surrounding country flocked into the town, but because there has been for years a steady inflow of immigrants from beyond the ocean, many of whom make New York their home. Something like this may be witnessed in this country with respect to the Irish immigration, for the natives of the sister island abound most in the industrial counties facing the Irish Sea, and only gradually make their way into the more remote parts of Great Britain.† As a rule, however, the excessive increase of the towns of the British Islands proceeds in accordance with the following process: the inhabitants of the country surrounding the town flock into it; the gaps they leave are filled up by immigrants from more remote country districts, and so on, until the attractive force of one of our rapidly increasing cities makes its influence felt to the most remote corner of the Empire. London is a good example of this recruiting process. If the reader will refer to Map I.,‡ he will find that London is surrounded by counties, a great proportion of the inhabitants of which are natives of other counties than of those in which they now reside. This is particularly the case with Middlesex (extra-Metropolitan), where less than 42 per cent. of the population are natives of the county. These counties are surrounded by others, whose native population is proportionately far larger. This feature clearly indicates the devouring process that is going on in London; and as the population of all these places is increasing annually, the places of those who leave for London must be filled up by an excess of births over deaths, or by immigration from other counties further removed from the Metropolis. The attraction exercised by the latter decreases with the distance, though subject to many variations due to local circumstances. The Census Returns prove conclusively that the counties nearest to London have, proportionately to their own population, furnished the largest contingent to the population of the Metropolis. We may conveniently divide these tributary counties into two zones. The first of these (including Middlesex, Surrey, Kent, Essex, Bucks and

* The average of migration amounts to 26·6 in England and Wales, 24·4 in Scotland, and 11·3 in Ireland.

† Local Element in England 69·9, in Scotland 68·9, in Ireland 86·9

* See Table in Appendix, column 8.

† See Map III. (Irish Element of Population).

‡ Local Element of Population. Also Table in Appendix, column 5.

Herts) has furnished 317,202 inhabitants to London, being tantamount to 15·5 per cent. of their total population. The second zone (including Sussex, Hants, Berks, Oxford, Northampton, Beds, Hunts, Cambridge, Suffolk and Norfolk) has furnished 290,509 souls, a number equal to 10·4 per cent. of their total population.*

Extending this inquiry to all parts of the United Kingdom, we obtain the following results:—

	Natives of Counties named in first column residing in London.	Per Centage of Total Population of Counties named in first column.
London	2,055,576	63·2
1st Metropolitan zone of counties	317,202	15·5
2nd " " "	290,509	10·4
South-western Counties	147,532	7·8
West Midland Counties	84,389	3·1
North Midland Counties	39,493	2·8
Monmouth and Wales	22,262	1·6
North-western Counties	27,589	·8
Yorkshire	27,448	1·1
Northern Counties	17,660	1·3
Scotland	41,029	1·2
Ireland	91,171	1·7
Man and Channel Islands	5,170	3·6

The deficiency in supply from the north-western counties (Cheshire and Lancashire) is due to the absorption of a large proportion of their population by numerous large manufacturing cities. On the other hand, if our zones could be bounded by concentric circles, instead of by arbitrary political boundaries, this law of migration would no doubt be borne out far more distinctly.

In the case of every other town throughout the British islands this law will be found to be in operation most plainly. A few instances we will give. Nottingham has a population of 86,621, of whom 63,444 are natives of Nottinghamshire, being 19·8 per cent. of the population of the county. The four contiguous counties have furnished 12,615 souls, being equal to 0·3 per cent. of their total populations; the remainder of England and Wales, 8116 souls, or 0·04 per cent.; Ireland, 1226 souls, or 0·02 per cent.; Scotland, 396 souls, or 0·01 per cent.

In Liverpool there live 10·3 per cent. of the population of Lancashire, 0·6 per cent. of that of the contiguous counties of Cheshire, Derby, and Yorkshire, 0·4 per cent. of the population of the rest of England, 0·6 per cent. of the population of Scotland, 2·9 from Man and the Channel Islands, and 1·4 per cent. of that of Ireland.

The numbers are:—

Natives of	
Lancashire	289,693
Three contiguous Counties	24,109
Rest of England	68,757
Scotland	20,394
Ireland	76,761
Man, &c.	4,186†

In Liverpool the Irish Element is conspicuous, nor is this to be wondered at, for that town is within easier reach of Irishmen than of the vast majority of the inhabitants of England, and we should feel justified almost in treating Ireland as a border county of Lancashire.

Amongst Scotch towns, we select Glasgow as one of our illustrations. That city is situated partly in Lanark, partly in Renfrew, and of its total population of 477,156 souls, no less than 226,115, or 47·4 per cent., are natives of Glasgow, whilst 52,858 more, or 11·1 per cent., are born in other parts of the two counties named. The Local Element, therefore, amounts to 58·5 per cent. of the population; 24·1 per cent. were furnished by the rest of Scotland, and 17·4 per cent. by Ireland, England, and foreign countries. The composition of the population of Glasgow is as follows:—

			Per Centage of Total Population of Counties named in first column, &c.
Born in Glasgow		226,115	47·4
First Zone.	Lanark (rest of)	27,585	4·9
	Renfrew (rest of)	25,273	12·5
	Dumbarton	7,754	12·7
	Stirling	11,883	12·7
	Ayr	23,407	11·6
Second Zone.	Argyle	12,685	15·9
	Bute	1,798	10·5
	Perth	7,705	6·0
	Fife	4,953	3·1
	Kinross	464	5·9
	Clackmannan	1,212	5·4
	Linlithgow	2,002	4·8
	Edinburgh	10,836	3·3
	Peebles	299	2·4
	Dumfries	2,999	4·0
	Kirkcudbright	803	2·0
Third Zone.	Inverness	3,893	4·6
	Aberdeen	3,207	1·3
	Forfar	4,036	1·7
	Haddington	1,021	2·7
	Berwick	608	1·7
	Selkirk	156	0·8
	Roxburgh	780	1·6
	Wigtown	2,915	7·6
Rest of Scotland		6,459	1·8
Ireland		68,330	1·3
England and Wales		14,500	0·1
Man and Channel Islands		124	0·1

The natives of the counties included in the first zone, and residing in Glasgow, are equal to 7·2 per cent. of the total population of these counties, those from the second zone are equal to 5·0 per cent., those from the third zone equal to 2·2 per cent. There are, however, considerable differences in the case of particular counties. The rural parts of Lanark have furnished but a small contingent in proportion to their population, whilst immigration from Argyle and Bute is far above the average of the zone within which these counties are situated. As regards the former, we must bear in mind that Lanark is not a county the inhabitants of which migrate extensively to other counties, whilst Argyle and Bute furnish a proportion of migrants far beyond that furnished by the majority of other counties. And this is not all. Glasgow is far more accessible to immigrants from these two counties than to those from other counties which are nearer to it, as far as mere distance is concerned. This proves that currents of migration are not governed by distance alone, but also by facility of

* The per centage for each county is:—Essex 18·4, Middlesex 16·7, Herts 16·4, Suffolk 14·5, Surrey and Hants 14·3, Berks 13·2, Kent 13·0, Oxford 12·3, Cambridge 11·3, Hunts 11·6, Norfolk 11·4, Sussex 9·1, Hants 8·4, Beds 8·3, Northampton 6·6.

† The whole of these appear to be emigrants from the Isle of Man, for the Channel Islands are far too remote to contribute in any appreciable extent towards the population of Liverpool. See also note at end of Table in Appendix.

access, and that the sea is frequently a less formidable obstacle to overcome than difficult roads by land and mountain chains.

Numerous other instances of towns whose population increases in a similar manner, viz., by an absorption of the surrounding country-population, growing less intense with the distance from the centre of attraction, might be given, but a consideration of the space at our command bids us to forbear.

A consideration of these and other cases leads us to believe that the increase in the population of large towns, irrespective of the natural increase resulting from an excess of births over deaths, is primarily due to *an inflow of the inhabitants from the surrounding rural districts, whose places are taken up in turn by immigrants from more remote districts*, and that the number of immigrants decreases proportionately with the distance from the town or with the difficulties of access. This inflow of population is modified, to some extent, by the extent of migration in different counties, and by the absorbing powers of other towns situated in the vicinity of the town under consideration.

1. The operation of this law would naturally result in many instances in the Local Element being stronger in the towns than in the rural districts of the county in which they are situated, and such is actually the case. In 31 towns out of the 87 included in the Table at the end of this paper, foremost amongst these is London, where the Local Element constitutes 63·2 per cent., whilst in the extra-Metropolitan parts of Middlesex and Surrey, it amounts to 41 per cent. only. The towns of Yorkshire, with one exception, follow the same rule, their Local Element varying between 72·8 and 89·5 per cent., whilst in the rural parts of the county it does not exceed 51·3 per cent.

The following is a complete list of these towns:—The Local Element (in per cent.) being given immediately after their names, that of the rural parts of the counties in which they are situated in parentheses:—

Huddersfield 89·5 (51·3), Leeds 83·4 (51·3), Halifax 82·7 (51·3), Bradford 81·3 (51·3), York 81·3 (51·3), London 63·2 (41·0), Sheffield 73·2 (51·3), Hull 72·8 (51·3), Paisley 71·2 (50·7), Exeter 83·7 (65·3), Stockport 82·2 (64·5), Hamilton 75·8 (61·7), Coventry 84·7 (69·7), Macclesfield 77·8 (64·5), Forfar 90·7 (77·2), Bristol 89·0 (79·3), Arbroath 85·1 (77·2), Airdrie 69·8 (61·7), Sunderland 72·1 (64·9), Preston 86·3 (80·2), Durham 71·4 (64·9), Hawick 74·6 (70·0), Plymouth and Devonport 69·6 (65·3), Dudley 75·1 (70·9), Bolton 84·0 (80·2), Kilmarnock 80·0 (77·2), South Shields 67·6 (64·9), Maidstone 78·1 (77·1), Greenock 51·6 (50·7), Worcester 71·5 (70·9).

2. But in addition to these towns, there are at least seven others which may fairly be included in the same category. They are situated close to the borders of two or more counties, the inhabitants of each of which enjoy equal facilities of access to the town. Birmingham is a case in point. The Local Element of its population amounts to 66·3 per cent., whilst in rural Warwickshire it is 69.7 per cent. But if we treat Birmingham as a town of an enlarged county, consisting of Warwickshire, Staffordshire and Worcestershire, the Local Element of its population would at once rise to 76·0 per cent. Glasgow occupies a similar position, and by allowing the inhabitants of the four adjoining counties to count towards its Local Element, the latter would at once be raised to 62·6 per cent., which is in excess of that of the rural portions of these counties. Other towns of the same kind are Wolverhampton, Chester, Gateshead, Carlisle and Montrose. In all of these the Local Element exceeds that of the surrounding rural districts, if we allow the natives of the adjoining county to count towards it.

We have disposed thus of 38 towns out of 87, and will now endeavour to trace the laws which govern migration with respect to these latter.

3. *Towns increasing at a more rapid rate than the rural population of the county, or increasing at a moderate rate, whilst the latter decreases, attract immigrants from longer distances, and the Local County Element may be less numerously represented in them than in the surrounding country.* When a town increases very rapidly, the resources of the surrounding country, in men, are frequently insufficient to meet the demand, and the hands required in the factories and workshops have to be drawn from a larger area. This immigration from beyond the county takes place more especially where several large flourishing towns lie in close proximity to each other. Forfarshire affords an instance of this kind. In two of its towns (Arbroath and Forfar) the Local Element is far stronger than in the rural parts of the county, whilst in two others (Dundee and Montrose) it is weaker.

The rural population of that county was 74,920 souls in 1861, but only 74,530 in 1871, and had consequently decreased to the extent of 390 souls. The towns, on the other hand, had 206,750 inhabitants in 1861, and 240,049 in 1871, and their increase was therefore 33,299 souls. Towards this number an increase of 10 per cent. amongst the rural population since 1861 could have contributed only about 7453 souls, whilst a similar increase amongst the town population would have contributed 20,675 souls, or a total of 28,128 souls, which is 4781 souls short of the increase ascertained to have actually taken place. This deficiency was made up by immigration from border counties, which necessarily resulted in a depression of the local element as noticed above.

The following are the towns belonging to this category, the figures placed immediately after the names of the towns denoting the decennial increase of their population in per cent., whilst the figures in parentheses denote a similar increase or decrease for the rural parts of the counties in which the towns are situated:—

Barrow-in-Furness 1800 (17), Middlesborough 108 (13), Dumbarton 75 (2), Belfast 43 (—5), Leicester 40 (2), Reading 29 (7), Lincoln 27 (5), Bedford 26 (6), Northampton 25 (4), Dundee 24 (—1), Yarmouth 20 (—3), Portsmouth 20 (10), Aberdeen 19 (6), Newcastle-on-Tyne 18 (10), Derby 16 (11), Newport 16 (11), Inverness 16 (—4), Nottingham 16 (8), Kirkcaldy 15 (2), Oxford 14 (2), Cambridge 14 (4), Tynemouth 14 (10), Southampton 14 (10), Ipswich 13 (2), Bury St. Edmunds 12 (2), Dunfermline 11 (2), Gloucester 11 (5), Dumfries 10 (4), Norwich 7 (—3), Shrewsbury 6 (2), Salisbury 5 (3), Perth 1 (—5).

4. *In counties whose rural population is equal to that of the towns, and increases at the same or at a higher rate, the towns attract a larger number of immigrants from beyond, and their Local Element is inferior to that amongst the surrounding rural population.* There are six such counties in the British Islands, and we feel justified in adding to Glamorgan, where the rural population does not quite balance that of the towns, but where an excessive increase of the latter more

than compensates for this deficiency. The details for these counties are as follows:*—

	Town Population Number.	Increase, 1861-71.	Rural Population Number.	Increase, 1861-71. *
Warwickshire	436,415	18 per ct.	197,774	3 per ct.
Lancashire ...	1,771,648	15 ,,	1,048,847	17 ,,
Yorkshire, W.R.	947,194	27 ,,	927,417	15 ,,
Glamorgan ...	184,592	17 ,,	213,267	33 ,,
Lanark	477,156	21 ,,	309,849	26 ,,
Edinburgh ...	241,259	20 ,,	86,879	21 ,,
Dublin	246,326	—4 ,,	—	—3 ,,

The Local Element in these counties, as far as known, bears the following proportions to the population:—

	Town. Per cent.	Rural Parts. Per cent.
Warwickshire	68·4	69·7
Lancashire	65·8	80·2
Yorkshire	78·0	51·3
Glamorgan	61·3	73·9
Lanark...	57·2	61·7
Edinburgh	56·7	60·2
Dublin...	63·3	64·7

Warwickshire and Yorkshire we may dismiss at once from further consideration, as the population of their rural districts increases at a less rapid rate than that of their towns, and although the towns of Warwickshire exhibit a slightly lower Local Element than the rural districts, this is sufficiently accounted for by the position of Birmingham, close to the boundaries of three counties (see above, sub. 2). The other counties fully bear out our theory, and we will take the case of Edinburgh in order further to illustrate it. In 1871 Edinburgh and Leith had a population of 241,259 souls, whilst that of the rural portions of the county only amounted to 86,879 souls. The Local Element in the city amounted to 56·7 per cent., in the county to 60·2 per cent. The city, between 1861-71, increased its population by 39,459 souls, the rural parts of the county by 14,887 souls. A very considerable portion of either increase must have been due to immigration from other counties, for an increase equivalent to the average throughout Scotland would have amounted to 20,180 only for the city and to 7200 for the county, and it is quite clear that a large proportion of the deficiency (27,000 souls) must have been made up by immigration from beyond. That such has actually been the case is proved by an analysis of the population according to birthplaces.

Its composition, in 1871, was as follows:—

Natives of	City. Number.	Per cent.	Rural Part. Number.	Per cent.
Edinburghshire ...	136,744	56·7	52,328	60·2
Eight border counties (including Fife) ...	36,938	15·3	18,155	20.9
Rest of Scotland ...	43,142	17·9	7,981	9·2
England and Wales...	10,751	4·4	3,105	3·3
Ireland	9,685	4·0	4,330	5·0
Other parts.	3,999	1·7	980	1·4
Total...	241,259	100·0	86,879	100·0

The rapid increase of the population of Edinburghshire is due, consequently, to the inflow of immigrants from the border counties and more remote parts of Scotland, England, and Ireland. The rural portion of the county, increasing at a more rapid rate than the city, absorbed nearly the whole of the increase of the population resulting from an excess of births, and the call of the city for more hands to do her work could therefore be responded to but feebly by the rural population of the county. Hence an inflow of immigrants from beyond its limits, and, as a natural result, a depression of the Local Element.

In Lancashire four towns, with respect to which we have information, exhibit the same features. These are Liverpool, Manchester, Lancaster, and Barrow-in-Furness. Two, however, follow the general rule laid down, sub. 1. These are Preston and Bolton, which lie in the very centre of the county, and are, therefore, not within as easy reach of immigrants as are the towns on the sea-coast or nearer to the borders. The depression of the Local Element in Barrow-in-Furness is due, moreover, to its exceptionally rapid increase as explained above, sub. 3.* We had believed, at first, that the depression of the Local Element in the principal towns of Lancashire, as well as in Glamorgan, might be due almost entirely to the presenee of natives of Ireland, but such is not the case. The Irish, no doubt, contribute towards the depression, but not decisively. In Liverpool where they are most numerous, they constitute 15·5 per cent. of the population, and even if we were to count them all towards the Local Element, the latter would amount only to 72·6 per cent., which is still below that of the rural parts of Lancashire. Nor is the presence of a large floating population in cities of the size of Liverpool or Manchester sufficient to account for the deficiency of the Local Element.

The population of Liverpool and Manchester are composed as follows:—

Natives of	Per Centage of Inhabitants. Liverpl.	Manchr.	Per Centage of Total Population of Counties, &c., named in first column. Liverpl.	Manchr.
Lancashire	58·7	67·1	10·2	8·9
Cheshire...	3·0	5·3	2·7	3·6
Derby	0·3	1·6	0·4	1·4
York	1·6	4·2	0·3	0·6
Rest of England & Wales	13·9	10·4	0·4	0·2
Man, &c.	0·8	0·2	7·7	1·4
Ireland	15·5	9·0	1·4	0·6
Scotland	4·1	1·9	0·6	0·2
Other parts	2·1	1·3	—	—
	100·0	100·0		

The towns then, which we consider to be governed by the rule just laid down, are the following:—

Liverpool, Manchester, Lancaster, Barrow-in-Furness (see also sub. 3, above), Swansea, Merthyr-Tidfyl, Glasgow (see also sub. 2), Edinburgh and Dublin.

5. *In towns having a large floating population the Local Element is frequently less numerously represented than in the rural parts of the county in which they are situated.* We have already referred incidentally to the depressive influence exercised by a large floating element upon the Local Element of a population. In large cities, however, this influence is only rarely decisive, and although the floating element in every commercial city, and particularly in our sea-ports, is undoubtedly large, we have been able to explain the

* We ought to state that *all* towns of 20,000 inhabitants and upwards have been included in this list.

* There is hardly a city in any part of the world which can rival Barrow with respect to the rapid increase of its population. The place does not even appear in the Census Returns for 1861, and certainly had less than 1000 inhabitants at that time. In 1871 it had a population of 18,200, in 1874 of 41,000.

deficiency of the Local Element, where it exists, from some other, more universal cause.

There are a number of instances, however, were it is decisive. At Portsmouth, amongst a population of 113,569 souls, there is a garrison of 11,621 men, and the small city of Colchester has a garrison of 2110. We may fairly assume that the majority of these men are not natives of the county in which they temporarily reside, and, together with their dependents, they must materially affect the relative proportions between the constituent portions of the population, and thus depress the Local Element amongst it. At Ayr, 6 per cent. of the population consist of soldiers and sailors, with their dependents, and even if only one-third of these were strangers to the county, the Local Element of the town (75·1 per cent.) would be brought on a level with that of the rural part of the country (77·2 per cent.). A similar depression of the Local Element may be noticed in towns which are the seats of large educational establishments, such as Oxford, Cambridge, Bedford, Winchester (which, moreover, has a garrison of 946 men). Then there are health-resorts and towns affected by annuitants and by grass-widows, whose husbands are on service abroad. Amongst these latter, we would mention Bath, Brighton and Truro. That there is something exceptional in the composition of the population of these towns may be guessed at from the large preponderance of females, for whilst throughout Great Britain there are 105 females to every 100 males, there are 148 in Bath, and 130 in Brighton.

6. The only towns remaining to be noticed are Dorchester, Boston, Cork, Perth, and Stirling. In the latter, the local element constitutes 53·9 per cent. of the population, whilst in the rural parts of the county it constitutes 67·6 per cent. The town has increased 4 per cent. in population, during the last decade, the rural portion of the county 6 per cent. There is a floating element, but it is not sufficient to account for the deficiency in the Local Element, but migration has been far above the average, and in this migration the town must have participated largely. Emigration, however, even in the most remote districts, and in those actually decreasing in population, is always attended by a counter-current of immigration, and if this immigration is directed principally upon the town, it must naturally affect the relative proportions between the constituent elements of its population. The same cause explains the deficiency of the Local Element in the four other towns named. They are decaying or retrogressive places in districts whose population is decreasing. The inhabitants of the towns take part in the emigration, which can alone account for this; the towns have lost a great deal of the attraction which they usually exercise upon the surrounding country population, and the emigrants are being replaced, in part, by immigrants from the border counties. It should not be forgotten, however, that the Local Element in the four towns referred to is still far stronger than any average throughout the country.

E. G. RAVENSTEIN.

(To be concluded in our next.)

SKETCHES OF LIFE IN GREENLAND.

THE sketches of European life in Greenland, which we propose to publish in this and some following numbers, were written by a Danish lady who was born and passed several years of her married life in the country. Hitherto our knowledge of Greenland life has been derived solely from the hasty notes of passing voyagers, and this is the first time that English readers have had an opportunity of learning the truth about Greenland from the pen of a native, who is really competent to give information on the subject. The Danish settlements in Greenland were very frequently referred to in the discussions on the despatch of an Arctic Expedition, as points upon which to fall back in case of disaster, as, in fact, an ultimate base of the operations. Perfect reliance was justly placed on the hospitality and kindness of the Danes. Still, it is generally supposed that these settlements are very wretched places in a "Land of Desolation." The following pleasantly written sketches will dispel this erroneous notion, and will show that there are happy European homes in Greenland, with agreeable society and amusements, and many things to give interest and occupation to educated people:—

I.—OUR SUMMER DAYS.

We, I mean the ladies of the colony of Godthaab, were very fond of our little private gatherings or afternoon parties. In summer they generally came off in the open air, on the hills, or in our garden, which was the largest in the place. In winter we, of course, held our parties indoors. The house which we inhabited was spacious and comfortable, facing a large inclosure called the garden. This was by no means analogous to European gardens, but nevertheless it was a most delightful place according to our Greenland ideas. The fence consisted of a rather high wall of stones and turf, on the top of which was a red wooden railing. A broad gravel-path divided the inclosed space into two parts, one containing rows of radishes, cabbages, carrots, and other vegetables; while the other consisted of a nice green expanse radiant with dandelions and little white flowers. In a corner of the latter half we had a grassy seat, and at the south end there stood a small greenhouse for the cultivation of European flowers and strawberries. In a sort of porch a table and several rustic chairs were arranged, and thither we often brought our needlework, discussing, over a cup of early tea, the affairs of the town with much spirit; at the same time catching glimpses of the homely roses and enjoying their delicious scent.

We seldom preferred the closed room to the fresh air outside, where we encamped among smiling daisies, or on the grassy seat. There many a stitch has been made, either in sewing, crochet or knitting, while we merrily chatted. But perhaps we oftener went to lower hill-tops than to the garden. There we also brought our needlework and a book, our fresh-made cakes, the small black tea-kettle, and our defective tea-things. We did not like to bring a good set, lest we should have to take too much care of them. We had no difficulty in finding a sheltered nook commanding a view of the sea. As to our reading, we might have been better off in the garden, as we were here very often disturbed by chance interruptions. But then we

did not mind much, as we never lacked conversation, which was easily kept up to the merry music of the *tatterats*,* which whirled across the bay beneath us in large flocks. Sometimes our goats† would pay us an unexpected visit, or we had to turn our heads at the chirping sound of a little snow-bird.‡ Lastly, some Greenland maid or boy would steal upon us, and shyly offer their meat and fish or other trifles of industry, and so our needlework might for a good long while lie untouched in our laps. In truth these excursions were hours of idleness, excepting as regards our eyes, which almost incessantly wandered in the direction of the opposite shore to the sunny hills of low "Northland," across the still blue surface of the waters.

Our readings were unquestionably more successful in the garden, although we were there surrounded by the merry national life, roars of laughter from noisy children, chatting sound of the young girls' talk, who, holding each other's hands or with an arm round each other's necks, went strolling up and down the long colony road. This road was called "Langelinie," in memory of our beautiful sea-promenade at Copenhagen. Later in the afternoon were heard the exulting answers of the women when shouted at to make themselves ready for flensing, on their husbands being observed from the distance, towing home seals. These sounds were always ringing in our ears from without, but we did not heed them, being quite absorbed by *Ernest Maltravers*, *Devereux*, or *Eugene Aram* in the year when Bulwer was our favorite author—later, of course, succeeded by others.

It was not until the ever-memorable cry—"Posts! posts!" was shouted all over the colony that we were induced to leave the fancy-world of our book for the real one. Oh, that most pleasant reality! Now all eyes turn to the sea, to the tranquil blue surface of Godthaab Fjord, and we strove to outdo each other in tracing and pointing out the subjects of our hopes and fears; the two postmen, in their kayaks, making their way among pieces of floe-ice. At last they get safe in among the rocks on the beach. At the same time there has been much running to and fro and a pleasant stir among the Greenlanders, who have nearly all collected on the beach to hear the news. The strangers are of more or less interest to every person, for those who do not get letters themselves (among the Greenlanders of the present day letter-writing is quite a usual thing) are no less anxious to hear from relatives and friends at other stations, and apply for verbal news from the postmen. Others are closely related to the postmen themselves, and so it is no wonder that everybody hurries down in great expectation. Some old women form an exception to the rest, and wait in their doorways or on the top of the low roofs where they must be contented to glean the intelligence by scraps from a passing child or a careless girl. The usual inquiries made by ourselves (viz., the Danes) are as follows:—"Where does the post come from? From Sukkertoppen, from Frederikshaab, or who knows; perhaps even from the far-off Julianehaab! Oh, but if they be even from the still more distant Europe, our delight is perfect! This last alternative the kayaks cleverly know how to announce at a good distance from the shore by pointing their oar in the air, in imitation of a mast, to indicate that the ship from Europe has landed the mail at some other colony. If so, the gleeful, joyous shouts, "*Umiarsui—it!*" ("Ship, ship, ah, the ship!") will be endless. I have known a few nervous wretches who could not stand our resounding chorus, but no one minded their complaints, which were disregarded in the otherwise uniform harmony. All were alike happy, thoughtless, hopeful, until the governor had opened the post-bag, and its contents might then, perhaps, for a time, at least disperse the common interest. A post, of course, can arrive at any time of the day, but I think they most frequently did arrive at the time when the Northland is in its glow and glory, and I know that a scene of this description has positively often interrupted our afternoon parties in the garden, and brought them to a close; otherwise we were not disturbed but for our own children (I shall always speak of the European children in general) putting in their heads across the red railing and shouting, "Please, Susanna is going to evening prayers at the Moravians, I want to go with her." "Well, you may go, dear!" And—"Will you allow two little Greenland friends, Arnak and Kistan, to come to tea in the evening?" or, "Might they make a party with some other children on an excursion to the nearest hills?" to which question a welcome "*Sorungna*" was the usual reply. Our children, when past a certain age, were at liberty to go anywhere they liked, and keep company with whom they chose, but when they wanted to go beyond the bounds of the main colony, they had to ask leave. My own daughter, who is by this time a grown-up girl, is sitting beside me now, and we often speak of those bygone days, and fully agree that those were times of romance.

Another afternoon our party is again electrified by the pleasing cry of "*Umiarsuit!*" but to-day the ship is not announced by post, we see it with our own bodily eyes emerging from the bleak point of Kangek out seawards; at first only the bow appears, then one mast, then another, and still one more perhaps, and presently the cleverer folks will know how to call the ship by name, as for instance, the 'Tjalfe,' 'Neptunus,' the 'Lucinda,' and so forth; and again we are full of the same happy presentiments—the Europeans especially in hot expectation of the dear letters from home, the Greenlanders sharing our hopes as they are initiated in our most important family affairs; but as to themselves, they exult in the anticipations of such enjoyments as a shipping time and a ship's crew always bring; and during the loading and unloading of the ship, groups of young and old, especially of women, sit from morning till late at night on the beach, either fooling away the hours with the heroes of the day, the sailors, or only passing the time in gazing at them and their work in silence. We have likewise no small enjoyment in store, inasmuch as we shall soon see and hear our dear countrymen. But the ship has not yet arrived. "Pray Mr. Sv., or good Niels Egede, tell us how long it will take the ship to cross the gulf?" "How is the current just now?" "Do say that we are going to have a little southerly wind!" Such were the questions and remarks of the ladies and children, often difficult enough to answer.

* The kittiwake gull. *Rissa tridactyla*.

† Goats were first brought to Frederikshaab in the time of Fabricius, and seem to have thriven well. They have them also at Godthaab, but not in North Greenland.

‡ The snow bunting. *Emberiza nivalis*. The Eskimo name is *Kopannuarsuk*.

Good-for-nothings and troublesome persons as we were we stood incessantly gazing at the charmed speck, only wishing that our sea, which we used to love best in its present tranquil aspect, would quickly adopt a more ruffled appearance in token of a little wind coming on, for wind we know the 'Tjalfe' must have to reach us—

"Shoot on blue billow, faster go!"

But during our excitement the other parts of the colony have been all in a bustle. Boats have put to sea, followed by a whole crowd of kayakers. They soon cleave the waters, hurrying to assist at the towing of the ship in case of a continued calm. How beautiful the evening! The sun is gliding below the Cook Islands;* the surface of the gulf is slowly crisping into little ripples, sparkling in richest hues, as a faint breeze from the south west is actually setting in—a very common occurrence in the Gulf of Godthaab—and we were having the immense satisfaction of seeing our *umiarsuit* advancing, and, moreover, rapidly again disappearing behind us, soon after to drop anchor among the rocks of our main harbour.

The sanguine youngsters quickly break up to change the scene, and now you see them climbing the hills to reach the large level leading to the harbour, where they alight on the most projecting cliffs like so many goats, not to return till the singing of the sailors has ceased, or the night advanced—the clear day-like night, as light as day but somewhat colder! The ladies take leave of each other, and repair to their homes and their little domestic duties, as putting the children to sleep, laying aside the costly milk of our goats, and distributing the supper to our servants; all of which, if the truth must be told, we performed with a feeling of apathy strangely new to us, as we seem possessed of but one thought: what news we shall hear when, after tea, we again meet at the governor's house. Some of our gentlemen who had gone off with the tow-boats would at least be able to report something from abroad when they returned, and if it had not been uncommonly hard work to get the ship safely moored in the harbour, the captain would probably also be of the party—and there he really comes, the kind, good captain! We could not help overwhelming him with all manner of questions, public and private, which he patiently and promptly replied to with remarks as the following:—"They were all doing well; I spoke to your mother the day before we left Copenhagen, and your mother was on board the very last hour," and so forth. As to politics, of course they duly had to be retailed to the gentlemen. We were so exceedingly happy, the whole lot of us, on such eventful evenings.

The governor's house is in a busy situation, close to the beach, with the main road running outside it; where the Greenlanders, especially on such a night, are walking in little groups, all sending a glance to the windows, and the bolder among the girls even speaking some words of fun up to us. We had taken it into our heads to sit up in the broad window-seats, whence we could both join in the gentlemen's conversation, and also observe what was going on beyond: "*Ajungidlat?* are they well, all of them?" (meaning our relatives)—"Oh yes, quite so, thanks," and they again run past, with friendly nods of their heads, and soon after we hear them performing their favourite dance, on the bridge of the lower part of the colony streamlet, a sound that is at once lively and monotonous. At the same time you may see a seal-hunter or a fisherman come to shore in the late night, apparently totally unconcerned as to all the surroundings—or a couple of Greenland mothers affectionately remonstrate with, and drag their sleepy children home.

It is now growing late, and the captain makes a remark to the effect that the harbour cliffs are not quite so near as he wished them to be, the meaning of which is plain to us all. The governor's cook puts in his head to ask whether it was time for the flag to be hauled down—it was hoisted this afternoon in honour of the ship entering our port—"Yes, of course, it was to come down;" and now we see Christopher, our exceedingly good-natured Christopher, run up-hill behind the house of Ane Katha, where the flagstaff stands on high, and from whence he soon returns, carrying the great "Dannebrog" rolled up in his arms (it was again to wave to-morrow in further honour of the ship). We also made ready to start, hosts and guests wandering together outside of the house, where the leavetaking commenced; our gentlemen still accompanying the captain across the nearest hills. A last look is sent across in the stilly night, to the hills and valleys of our cherished Northland—all is hushed and still. The gentle murmurs of the billows and the sea-shore, and the melodious sounds from the little waterfall behind the doctor's house, are the only sounds to break the stillness of the night. Good night! and still good night! and a nod to a girl drawing water at the streamlet, and the day has come to a close, and we go to bed in happy anticipation of to-morrow. We have not yet got our letters, it was too late to bring the post bag to-night—but to-morrow!

N. S. R.

(To be continued.)

* *Kokkerne* of the Danes, at the entrance of Baal's River.

THE BASIN OF THE OB AND YENISEI RIVERS.

THE basin of the Lower Ob and Yenisei Rivers, in Northern Siberia, is attracting much attention just now, in consequence of the presence of various expeditions which Professor Nordenskiold's successful journey of last year had the effect of starting. We take the opportunity of laying before our readers some of the most interesting facts respecting this region, which the Bremen Society for the Prosecution of German Arctic Exploration have reproduced in their useful periodical publication, chronicling the proceedings of the Bremen travellers, Drs. Finsch and Brehm, and Count Waldburg Zeil.

An interesting paper on the subject of the Ob River was read by M. Sidoroff, on the 2nd (14th) March, at a meeting of the Society for the Encouragement of Russian Commerce and Industry, which was convened in honour of the German travellers referred to above.

The author commenced by recapitulating the chief names with whom the opening up of Siberia was associated, and touched upon the interest contained in a remark of one of Dr. Nordenskiold's party last

year, that vegetation extends further northward along the Yenisei than it does in the Scandinavian peninsula. He understood that the Bremen party would travel to Barnaul, and from that point journey down the Ob. Barnaul itself was a town of some interest, and worthy in his opinion of being selected as a starting point for operations. It possessed a mineralogical and zoological museum, in which there was a collection of Siberian antiquities and a library. The climate is temperate, various kinds of cereals and vegetables, including melons, flourish; and the necessaries of life are, generally speaking, more easily procurable there than in other parts of Siberia. Turning to Beresof, which was situated at the junction of the Ob and Soswa in 64° N. latitude, there was a peculiar species of herring found in great quantities in the Saswa, which did not occur in any other rivers of Siberia. Further north, towards the mouth of the Ob, large numbers of sturgeons were caught, and a valuable sort of glue was derived from them, while pike, perch, Siberian salmon, bream, herrings, and many other kinds of fish, were common. In fact the Ob is the most favourable stream for studying the fishes of Siberia, and the mouth is the best part of the river, as the fishes all make for the sea or for the neighbouring streams when the winter sets in, a circumstance which has not as yet been satisfactorily accounted for. During the winter a hole need only be made in the ice to enable all the fish in the vicinity to be caught. As soon as the ice begins to break up, the fishes commence to ascend the river, seeking the deeper water until the rays of the sun begin to warm the water; when all except the sturgeon, sterlet and salmon seek the flat depressions adjoining the rivers, which in spring are under water, and there they seek their food till the waters here begin to retire into their normal channel. As soon as the fishermen perceive this to be the case, they shut off the escape channels of these depressions by sluices, and catch the fish in small nets. Sometimes the quantity caught is so great that the sluices are actually broken down by the accumulation of fish. When a sudden and severe frost occurs in springtime, the effect is to freeze all the shallow water alongside of the banks. This is in turn covered by the waters from the upper course of the river, and these loosen the fragments of ice frozen to the banks, and retiring in their turn leave an enormous quantity of fish on the ice, a large portion of which the Samoyedes have not strength to collect, and which is, in consequence, carried out to sea, a prey to birds and beasts of prey.

The Ob Gulf abounds also in walruses, seals, and dolphins. Kushevatskoye, the best station for fishing in the district of Beresof, lies about 50 versts below that town, and boasts several dwelling-houses and a church. The slopes on which it stands have been said to contain a considerable quantity of mammoth remains. At a distance of 350 versts from Beresof, situated in about 66° 34′ N. latitude, is the settlement of Obdorsk, which numbers about 42 houses, and 150 inhabitants. It is the northernmost settlement of the Government of Tobolsk; its houses are built of stout ships' timbers, and it has a pretty wooden church, there being both regular priests and missionaries in the place. Anyone entering the village in summer would suppose the inhabitants to be asleep, the explanation being that at the time they all lock up their houses and are gone a-fishing. At Christmas time there is an annual fair, which serves to attract about 10,000 people, and the chief articles of trade are the furs of the fox, lynx, squirrel, marten, otter, bear, wolf, reindeer, ermine, and occasionally sable, and ready-made winter clothing. There are thirty-two steamers which ply upon the Ob, and from six to eight of them descend as far as Obdorsk, and some even 250 versts further. About 40 versts north of Obdorsk, is the summer residence of Prince Taishin, the chief of the Ostyaks of the district. In 1854 this Prince was in St. Petersburg, and was hospitably received, and presented with a gold medal and collar of the Order of St. Anne, as well as a rich robe and a gilt silver goblet, by the Emperor Nicholas.

Reindeer are very plentiful in this district, but they are subject to the ravages of a fatal contagious affliction which sometimes attacks even men. Among birds, mews, different sorts of ducks, geese, swans, and most of the known Arctic fowl abound. Ammonites of great size are found, and one obtained by M. Sidoroff, in 1864, weighed about 25 *puds*.

The riparian settlers, especially near its mouth, engage extensively in fishing, the hauls amounting to at least half a million *puds* per annum. The fishing commences at the beginning of July and lasts till October. The basin of the Ob is very rich in wheat, minerals, cattle and other products, and the inhabitants amount to 2,500,000 in number. The trade of this region would undoubtedly develope most extensively were a practicable sea-route opened from the Gulf of Ob to the Sea of Kara, and the first step to be taken is a detailed survey of the mouth and bar of the Ob itself.

The German expedition will visit regions where the northern lights are known to be characterised by frequency and intensity. In Spitzbergen the lights are accompanied with a faint crackling noise, while near the mouth of the Yenisei, on the other hand, the noise is so loud, according to the natives, that reindeer and other animals are frightened at it. In Turuchansk the sound is not heard, and in Francis-Joseph Land the Austro-Hungarian expedition remarked that it was heard only at such times as the northern lights appeared in the southern part of the heavens. Franklin's opinion was at first that the noise proceeded from the light, but subsequently he considered that the causes of it were terrestrial. Wrangle had few opportunities of seeing the northern lights, but he was not at all clear that they were accompanied by any sound; while Lomonossof, who visited Spitzbergen, was distinctly of opinion that they were so accompanied. A party of eight, who were crossing the Ural Range in about 66° N. latitude, heard a crackling noise like that of electricity at the very moment that the lights were most intense. A former governor of Tobolsk, too, informed M. Sidoroff that he had twice heard this peculiar noise, once in the Gulf of Ob, and once in Obdorsk. M. Sidoroff enumerated other instances, and drew conclusions from them that the Sea of Kara or the Gulf of Ob formed the centre of strong electric and magnetic currents; that eastward of the Gulf of Yenisei and westward of Novaya Zemlya the sound decreased in power, but that the Shetland Islands formed an exception.

According to M. Latkin the length of the Ob from the confluence of the Bya and Katuni to its mouth is 3200 versts.

THE SEAT OF WAR.

OUR sketch-map of the Seat of War is intended to show more especially those places which have come prominently before the public in consequence of recent events, and are, for the most part, not to be found on ordinary atlas maps.

The Servian forces have been divided into four armies or corps, and they have crossed the frontiers at no less than nine places, without achieving a single success anywhere.

The army of the Drina (1st division) under Alimpitz, has occupied Little Zvornik and fought a number of engagements near Byelina without having been able to capture that place.

The army of the Ibar (2nd division), General Zach, crossed the frontier on the 6th of July, fought an action at Kladina (beyond the Yavor Pass), but failed in an attempt to take Novi Pazar. Detachments of this army under the Archimandrite Duchich and Captain Ilich, demonstrated against Nova Varosh and Sienitza, but they likewise failed. The places named are on the high road from Saloniki into Servia, and the capture of any of them would have been of the utmost importance to the Servians.

The main force under Chernayef, consisting of three divisions, crossed the frontier to the west and to the east of the Morava, but its operations were as little successful as those of the other corps. Colonel Yovanovich was beaten at Prokoplye and forced to retire, whilst Stratiromich's reconnaissance in the direction of Ak Palanka and Pirot, on the road from Sofia to Nish, resulted in failure. The army of the Tinok, lastly, under Leshyanin, still occupies Saichar, in spite of repeated attacks directed against it by the Turks.

The Montenegrins, under Prince Nikita, appear to have been more successful, for they have advanced to within a few hours march of Mostar, in the north, whilst in the direction of Scutari they have destroyed several blockhouses.

If the results of this war be dependent merely upon numbers, then the Servians and their allies would appear to stand no chance of success. Servia has a population of 1,340,000 souls, whilst that of Turkey in Europe, exclusive of Rumania, is 8,430,000. Of these latter 3,557,000 are Muhammadans. There are 1,326,000 Turks, about 1,000,000 Albanians, 1,388,000 Servians, and 2,877,500 Bulgarians. No less than 723,000 Albanians, 463,000 Servians, and 860,000 Bulgarians are Muhammadans. In the province of Bosnia there are 481,000 Muhammadans to 852,000 Christians, distributed as follows:—

Sanjak.	Christians.	Muhammadans.
Sarayevo	69,000	83,000
Zvornik	168,000	123,000
Travnik	101,000	49,000
Novi Pazar	90,000	66,000
Banyaluka	177,000	44,000
Bihatye	105,000	72,000
Herzegovina	142,000	43,000

DR. BECCARI'S THIRD VISIT TO NEW GUINEA.

A FEW days ago I received a long letter from this distinguished naturalist and traveller; it is of the very utmost importance, shedding, as it does, an entirely new light on some of the most obscure questions of ethnology. Anything relating to the Papuans is, moreover, at the present moment of very great interest, for a goodly set of enterprising travellers (letting rest the now famous Captain Lawson) and eminent naturalists have very recently been lighting up the hitherto very little known New Guinea, and beyond doubt at the head of them stands Beccari, although he has ever modestly held aloof. A short time since I visited at Genoa the immense collections he has sent home, and I must confess that I was quite bewildered at the riches amassed; whole drawerfuls of the rarer paradise birds, parrots, *Tanysipteræ* and pigeons of Papuasia, about 7000 birdskins; large series of *Dendrolagus*, *Cuscus*, bats and other mammals of that region; jars of large size filled with strange and rare reptiles, amphibia and fish. I assisted, together with Marquis Doria, at the opening of the cases containing the ethnological collection made during Beccari's second voyage to New Guinea, in the early portion of last year. What will the anthropologist say to a magnificent series of one hundred and ninety-one Papuan skulls, besides a most complete collection of weapons, implements, idols, carvings, clothes, ornaments, &c., belonging to the less-known tribes of Geelvink Bay, and the large islands to the north? Much comes from Jobi, from whence are also some peculiarly fine glass ear-rings made by the natives themselves, who buy broken bottles from Dorei traders, and melt the glass, casting it into moulds. That unique collection is to be deposited in the National and Anthropological and Ethnological Museum at Florence. At Ansus, in Jobi, they mummify their dead; some of the heads sent by Beccari were in this state, and very interesting.

Beccari's letter, of which I send an exact translation, is also well timed, for it greatly completes the interesting account given by Dr. Miklucho-Maclay, of the ethnology of the Papuans of Astrolabe Bay, published in the first two June numbers of *Nature*. I shall now allow our traveller to speak for himself; after touching some most important facts relating to the ethnology of the *Mafor* Papuans, he gives us an account of his third voyage to New Guinea, made through express invitation of H.E. the Governor-General of the Dutch Indies, on board the war steamer 'Surabaya,' sent to explore the further limits of what is considered *Dutch* New Guinea.

"TERNATE, *March 6th*, 1876.

"DEAR FRIEND,—In one of your last letters you put forward several queries on questions of ethnological interest, as an instigation for me to make researches on the subject; not having as yet replied thereto, I shall now endeavour to satisfy you as far as I can.

"You asked me firstly, whether any Negritoes were to be met with in New Guinea? I must first confess that being at present wholly unprovided with books of reference, it is a very difficult task for me to form a precise idea of those races of mankind which have not come under my personal observation; thus I am without any exact criterion of comparison. The opinion, however, of men like Maclay and Meyer, who have seen both Negritoes and Papuans, must be of some value.

SLAVONIA
BANAT
SYRMIA
BOSNIA
SERVIA
RUMANIA
BULGARIA
HERZEGOVINA
MONTENEGRO
ALBANIA
R. Danube
Neusatz
Peterwardein
Versecz
Weisskirchen
Pancsova
Semlin
BELGRAD
Shabatz
Obrenovatz
Kubin
Kladovo
Negotin
VIDIN
Danube
Banyaluka
Travnik
Dolnye Skoplye
Vitez
Zvornik
Valyevo
Gorazde
SARAYEVO
Visegrad
Focha
Ushitze
Chachak
Kragujevatz
Yagodina
Rashan
Krushevatz
Alexinatz
Knyashevatz
Belogradchik
Lom
Mostar
Blagay
Nevesinye
Stolatz
Gatzko
Trebinye
Ragusa
Cattaro
Tsetinye
Budua
Scutari
Lake of Scutari
Plevlye (Tashlija)
Priyepolye
Nova Varosh
Yavor
Syenitza
Novi Pazar (Yenibazar)
Ivanyitza
Mitrovitza
Prishtina
Vranya
Yakova
Prizbendi (Perzerin)
Kumanova
Skoplya (Iskub)
Veleze (Kyeprylv)
Kalkandelen
Tetchen (Ipek)
Kolashin
Nikshitzi
Lyesh
Tirana
Durazzo
Dibra
Krchava
Shtiplye (Ishtib)
Railway from Salonika
NISH
Pirot (Sharkoi)
Leskovatz
Ak Palanka
Topolnitza
Sv. Nikolo P.
Sofia
Slivnitza
Radomir
Kestendil
Dubnitza
Egri Palanka
Juma
Struma
Vardar
Gilan
Mramor
Prokoplye (Urkub)
Kurshumlye
Yarsale
Raditka
Morava
Ibar
Drina
Lim
Uvatz R.
Save
Kulpa
Una
Verbas
Bosna
Narenta
Zeta
Moratcha
Tara
Piva
Drin
Mati
Black Drin
White Drin
Shkumbi
Semeni R.
Ossum
Vistritza
Struma
Mesta
Maritza
Tundja
Arda
Kara Su
Ada Kaleh (Turkish)
Orsova
Turnu Severin
Craiova
Petrovatz
Milanovatz
Rachas
Svrlinatz
Gorny Milanovatz
Tyupriya
Paratyin
Saichar
Orlyana
Archar
Banya
Nishava
Jastrebatz
Ivanyitza
Mokra Gora
Rogatizza (Chelebi)
Konyitz
Foinitza
Krezhevo
Sokolye
Kozluk
Zvornik
Shepche
Maglay
Tesanye
Dolnye Soli (Tuzla)
Gradashatz
Brchka
Srebrenitza
Kladanye
Vlasenitza (Birch)
Nova Kasaba
Kruppanye
Lyubovya
Lyubinye
Lyubushki
Gabela
Metkovich
Ubli
Nikshitzi
Kolashin
Trebinye
Ragusa
Spush
Dolyahi
Tundina
Fodgoritza
Kuchi
Malyensari
Kuchi-Drishta
Plava
Gusinye
Tetchen
Yakova
Prizbendi
Kalkandelen
Kumanova
Skoplya
Veleze
Tirana
Durazzo
Dibra
Krchava
Lyesh
Shtiplye
Railway from Salonika
Gilan
Kestendil
Egri Palanka
Dubnitza
Juma
Struma
Vardar
Radomir
Sofia
Slivnitza
Pirot (Sharkoi)
Leskovatz
Ak Palanka
Topolnitza
Sv. Nikolo P.
Nishava
Timok
Iskar

The fundamental basis from which I believe you start as to the distinction between Negritoes and Papuans, is the rounder shape of the skull in the former. I do not know whether that character has been verified in a large series of Negrito crania, as to what relates to the Papuans (taken as a whole), the shape of the skull, although in most cases unquestionably dolichocephalic, may often offer an approach to the brachicephalic type. The large collection of Papuan skulls which I have recently sent home confirms, I believe, what I have stated. I can, however, no longer hold the opinion of the unity of the Papuan race, and I persist in that already expressed in my last letters, viz., that the Papuans are a mixed people. My own observations have brought me to the conclusion that the more a Papuan has negro features the more his skull is dolichocephalic; the most dolichocephalic of all Papuans are therefore the *Alfuros* of Onin, and some *Alfuros* of the neighbourhood of Has. The Onins on the coast are too much mixed with other races to be taken into consideration. At Has, in February last year, I saw a few natives absolutely black, with woolly hair very short, very prominent eyebrows, the root of the nose much depressed (excavated), the jaw and cheek-bones very broad, the forehead extremely narrow and slanting (or rather the temporal fossæ very deep), the belly protuberant and pendulous, the chest very wide; in short a most brute-like type of humanity. Last November, returning to Salvatti with the Dutch Expedition, I again saw a few Papuans (slaves), who agreed with the above description. It appears to me that this is the lowest type of mankind observed by me in New Guinea, and I believe that it belongs to that race which has least been mixed up with strangers, and which perhaps, at a period more or less remote, once ranged not only in most of the Malayo-Papuan Islands, but reached the Malayan Peninsula and the Philippine Islands.*

"If the *Ahita* of the Philippine Islands are now very different from the Papuans, and if their cranium is short and round, instead of being long and narrow, might we not explain the divergence on the score of the admixture of the former with the tribes which surround them, who belong to an eminently brachycephalic (mongoloid) type? And that the result of such hybridism of a long and narrow headed race (*Oriental negroes* or *Primitive Papuans*) with a short and round headed race (*Malayans*) has been a mixed race with a short skull, but a preponderance of Papuan (negroid) characters? Stature has little or no value in such comparisons. Small men with a more or less rounded skull, the hair in little bead-like tufts (*glomeruli*), slight prognathism, and very stupid; people, in short, who answer pretty well to the descriptions given of Negritoes, are by no means rare in New Guinea, especially amongst the *Karon* and the *Alfuros* of Galewo Strait. Slaves belonging to that type are to be seen even at Ternate. Only I could not affirm to have met with a whole tribe answering to such a description, unless such was the case with some *Alfuros* of the Mariati River, of whom, however, I saw too few to be able to decide. As to the stature of the Papuans, we must apply the same restrictions which bear out with the rest of mankind. It is generally asserted that the Papuans are a tall people, but such an assertion is based on an optical illusion caused by their state of nakedness. I have not been able to take actual measurements on many Papuans, but I have often been in favourable conditions for making comparisons on the subject, and ascertaining their average height; the result has been, that only amongst the *Vandamen* have I met with men above my stature (1 meter, 70); I have frequently ascertained this by inducing the natives to stop near a post, or beneath a door, with the height of which I was acquainted. Again, amongst the people of Bessir and Waighen, and amongst the Papuans of Ansus (Jobi), have I met with well-proportioned men. The *Alfuros* of Has, of whom I spoke, the *Onin*, the *Karon* and most of the *Mafor* of Dorei and Mansinam, do not exceed, as far as I am aware, the ordinary stature of the Malays; and the greater number of the Papuan slaves which are to be met in the various ports of the Molucca Islands are decidedly short.

"In your letter, you express great doubts as to an existing admixture of Papuans and Hindus, mainly relying on the fact that no remains of Hindu monuments have been met with in the Moluccas (and New Guinea). You believe that the Hindus have left no traces of their presence in the blood of the people which were once under the influence of their dominion and civilisation (in the western portion of the Malayan Archipelago), and therefore it appears strange to you that they have left so strong a mark on the *Mafor* Papuans. I answer, that in asserting that amongst the *Mafor* Papuans (and I include under that term the greater portion of the natives of the shores of Geelvink Bay) I met with not merely the *trace*, but a *preponderance* of Hindu blood, I meant Caucasian ethnological characteristics; from whence such elements were derived I cannot at present decide, it is probable that they *did not* make their way across the Indian Archipelago, through Java and the Moluccas; for in that case I do not believe that the Caucasian type could have been transmitted in so large a proportion. Neither could I affirm that they may have had a Polynesian source; I am more inclined to think that the Caucasian influence spread from the Asiatic continent to New Guinea, and, perhaps, Polynesia by way of the northern coasts of Borneo, Celebes and Halmahera. The Hindu dominion in Java is too recent to have caused any great alteration in the ethnic type of that people. For, as you are well aware, the Indian monuments whose remains are met with in Java are not older than the seventh century, E.V. When I speak of Indian colonists in New Guinea, I mean to imply a far more remote period; in fact, I do not see why we should not set it down as contemporaneous with the Stone Age in Europe. If it is from India that we claim our own civilisation to have originated; having spread right through Western Asia, why should we think it strange that it should also have spread in an easterly direction by the far easier route of a stormless sea, reaching thereby the northern shores of New Guinea? The perfect similarity between the stone implements at present used by the Papuans and those which once stood in the hands of our forefathers, might also imply that the people of the Far East as that of the Far West learnt the art of working stone from the inhabitants of the intermediate land which is supposed to have been the cradle of civilisation. As far as the *Mafor* are concerned, I do not, however, believe that we need go back to so remote an age. The supposition that the Caucasian (Aryan) migration towards New Guinea kept along the northern end of Borneo, and proceeded thence to Halmahera, is based on the fact that a large portion of the natives of the latter island, but especially the *Galelo* and *Tebello*, are remarkable for being tall men, with fair complexion and regular (Grecian) features. It is also singular how several of the tribes of Halmahera have Hindu names: as the *Veda* and the *Patani*. The family of the Sultan of Tidore have decidedly Caucasian features, and preserve the tradition of having come from the West; probably, however, at the time of the later Hindu dominion in the Archipelago.

* "I do not find at all strange that Mr. Logan should have entertained the notion that the *Oriental negro* was derived in a direct manner from Africa. Nor can I comprehend the objection which many naturalists have to the hypothesis of an ancient continent once occupying the present place of the Indian Ocean. Lemuria, or that hypothetical land, raised on the score of zoological (and I would add botanical) affinities which certainly connect some parts of Malesia with the African continent, is, I believe, far from an improbability. If we recollect that nearly all the rocks of the African continent (as indeed most of those of every other portion of our globe) are considered to have been formed under the waters, we may well ask what was emerged at the time that they were submerged?"

"It appears to me that strong indications, if not the proofs, of the Indian origin of the Papuans are to be seen in their own traditions, in the similarity of the latter with those of the Hindus. For instance, the Papuan tradition of the *Korano* Konori, which is undoubtedly genuine, and not introduced by missionaries, and which is a dogma generally accepted and believed in by the *Mafor*. The Papuans relate that they originated from an old man named *Manugundi*, which name signifies 'himself.' In *Manugundi* we may recognise Brahma, who is defined as 'He who exists through himself.' *Manugundi*, through the virtue obtained from Venus, the morning star, named *Samfari* by the *Mafor*, begets a son from a virgin, who brings forth the redeemer of the Papuans, the *Korano* Konori. Is not this the counterpart of the history of Brahma, who begets, by the virgin Devanaguy, Christna, the Hindu Messiah?

"Manu is the great lawgiver of the Hindus; Manuen is the evil spirit of the Papuans, and, in a certain sense, he who judges and punishes; for the Papuans, as many other natives of the Archipelago, cannot allow that illness, misfortunes, &c., come through natural causes. Inarvur is another of the spirits; he is believed by the Papuans to reside in the mist which hangs over their primæval forests; he might be identified with the Hindu Narayana, who, according to Manu, moved upon the waters.

"Some of the Papuan customs are also probably of Indian origin; as the *Sutti* for the death of relatives; the impurity of women after child-bearing, and the purification which they must undergo; the adoption of children; the custom that a widow must marry the brother of her late husband, &c.

"The *Mafor* show such traces of a former civilisation, and are now in such a state of degradation, that I cannot help thinking that they got their civilisation from strangers. I can hardly believe that, completely isolated as they are, and in their present social condition, they could have invented the division of the year into twelve lunar months, giving to each month a proper name; that they should have names for each of the four cardinal points, and not only for isolated stars, but complexive ones for entire constellations, defined as we are used to define them; thus the constellation of Orion is called by them *Kokori*, and is considered to be the husband of the Pleiades, called *Sarmuri*. It is the position of the last-named constellation, which, according to the hour of its rising, enables the *Mafor* to distinguish the seasons. The artistic taste of the latter people is remarkable, and an attempt to trace the origin of the different designs which they use to adorn their implements, &c., would furnish most interesting results. I shall not speak of their language, for I have not the means of making comparisons. Data on the *Mafor* language are not, however, as scarce as is generally supposed. I believe that an extensive dictionary of that language is at present being printed in Holland by Mr. Van Hasselt, formerly missionary at Mansinam. The Papuans do not burn their dead bodies, but the *Ansus* (Jobi) and the *Arfak* often mummify their dead, and preserve the bodies with great veneration in their houses. Traces of the belief in metempsychosis can be found amongst the *Mafor*. Many will not partake of the flesh of the cassowary, saying that their ancestors have assumed the shape of those birds. The physical type of the *Mafor* of Dorei, and of the Island of *Mafor*, is much degenerated, I believe, through admixtures with slaves of inferior races, which used to be formerly obtained in large numbers by those Papuans during their piratical expeditions along the greater part of the Eastern portion of the Archipelago; it is to be observed that the Papuan fleets used to get as far west as Sumba. Such expeditions used to be performed in company with the people of Patani, Moba, and Veda, in the Island of Gilolo (Halmahera). The *Ansus* and the *Vandamen* are the tribes which possess, at present, the finest and purest Aryan types, and it is remarkable that at Ansus such is also the case amongst the women.

"I should yet have to say something about the so-called Papuan idols, or *Karwar*, but that would carry me far beyond the limits of a letter. As it is, I have written thus far simply to endeavour to show that, if in writing to you I had ventured on the opinion that, the *Mafor* Papuans were of Hindu (Aryan) origin, my supposition was not wholly unsubstantiated.

"A Papuan tribe which has much interested me is that of the *Arfak;* as long as I had only seen the hill-men near Dorei, I believed that they merely formed a small local tribe, but in my last exploration of New Guinea, I have been able to see that a portion of the natives of Papua Telandgian have many points of resemblance with the *Arfaks:* it appears to me that the latter are an older and more primitive people than the *Mafor;* these are seamen, whilst the former are landsmen and agriculturists. It is perhaps amongst them that Polynesian elements ought to be sought.* But as I now intend to relate the principal incidents of my last trip to New Guinea on board the 'Surabaya,' I shall have more than one occasion to revert to the subject.

"On the morning of the 18th of last December, at sunrise, we sighted Mount Cyclops, whose eastern peak has the shape of a volcanic cone; the neighbouring hills are bared of the forest and extensively cultivated; near the coast the soil is in many places very red: the name of *Tanah mera* given by the Papuans of Geelvink Bay and by the traders of Ternate to this portion of the Telandgian shore, owes its origin to its red colour. At 2 o'clock in the afternoon we entered Humboldt's Bay, or *Telok Linsciu;* we were at once surrounded by about ninety canoes, each containing three or four naked Papuans. Scarcely had the 'Surabaya' anchored, than a savage hurrah of gladness came from each of those canoes. We were lying at about 2000 metres from the shore, nearly in the middle of the bay, and bothered besides by the continual rolling of the vessel. We could plainly see several villages ensconced in an inner harbour completely shut out from the wind. The larger villages were, however, on a kind of lagoon, and were hidden from us by some hills. We did not land that day, but we were able to trade largely with the natives, and obtain a fine set of ethnological objects of great interest, such as stone hatchets, bone daggers, ornaments, &c., exchanged for Venetian glass beads, knives, and other nicknacks of no value to us. On the morning of the 19th, as it appeared to me that no one seemed inclined to land, and as the Papuans appeared to be friendly, I proposed to Mr. Bruijn to come with me and pay a visit to the villages on the lagoon, which had been visited by the members of the 'Etna' expedition. We each got into a Papuan canoe, and having, by signs, made the natives understand that they should each of them receive a *parang* or knife on our return to the ship, if they took us to see their villages, we proceeded to land. As soon as we were at a certain distance from the steamer, my boatmen stopped rowing and began to touch and examine me; I do not know whether it was to make sure that I carried no weapons, or else to satisfy their curiosity regarding my dress and the colour of my skin. My shoes appeared to cause them the greatest surprise, and they never left off touching them in order to find out whether my feet were like theirs. I took them off, to show them that such was really the case. The villages in the lagoon corresponded with the description of them given by the members of the Dutch commission on board the 'Etna.' On reaching them we found that only the women had remained behind with the smaller children, the entire male population being out in the canoes around the vessel, which could no longer be seen from the village. All the women came out to meet us,

* It is well worth observing that with the *doubtful* exception of the Sago palm, none of the plants cultivated by the Papuans are indigenous in New Guinea.

for seeing us with their friends they had no fear. From the cries and gesticulations it was plain enough that our visit caused pleasure and surprise. Some of the women wore a short petticoat of bark or a rough kind of netting; it was, however, only the case with the older and married females, the young women and girls appeared to glory in their complete state of nudity. The houses being on piles and completely in the water, we approached a platform near one of the temples and mounted thereon; we were then led by hand, each of us by two of our boatmen, who conducted us in the houses and in the temples, showing us every object, but at a running pace; their anxiety to get hold of the promised reward was so great that they wanted to get us back on board the steamer as soon as possible. One of my guides, or *Wappimi* as they called themselves, and which, I believe, only means 'friend,' holding my hand with the other, made a sign as if to cut off my head; I do not know what he intended to imply, but I supposed that he wished to assure me that I was not to fear anything of the sort for myself. Well satisfied with our visit to the village of Tobbadi, we returned on board. In the lagoon, besides Tobbadi, where I counted forty houses, there are two other villages, one named Dgioros with seventeen houses, the other Ondgieran with only five.

"The next day the Dutch Commissioners also set out to visit the villages, and I went with them. The friendly demonstrations on the side of the Papuans were not wanting but were mostly of rather too violent a nature, and we were well contented when we were able to get free of them, although for some time they greatly amused us. We had all to allow our faces to be painted black, with a mixture of charcoal dust and saliva, and the Papuans would deck us out in their trinkets, and our necks and arms were soon loaded with necklaces and bracelets of shells, used, I suppose, also as talismans. The repeated embraces of those savages left, moreover, but too plainly their traces on our white clothes. One fellow took into his head to pierce the ears of the captain with a bone point, in order to pass therein a huge pair of ear-rings; and we had the greatest possible trouble in dissuading him, and making him understand that such an operation was far from desirable. In the afternoon I asked for a boat, and, with Bruijn, landed on the nearest shore. We had also taken our hunters with us, but so long a time had to be employed in reaching the shore, that very little was left for collecting specimens. However, I managed to find some twenty species of plants, amongst which a *Proteacea*, an *Acacia*, a *Casuarina*, different from the ordinary Malayan species; also a *Leptospermum*, and some other plants of an Australian type; the spots where the forest had been cut down were covered with grass, and this, to my great surprise, was not the *Alang-alang* (*Imperatæ* sp.) so universally spread all over the unwooded parts of the Archipelago, and also in those portions of New Guinea which I had already visited, but, instead, a species of *Andropogon*. We were only able to obtain three or four birds of no great interest. Darkness, which was rapidly coming on, obliged us to return. On the beach, just before embarking, some of the natives offered me a cocoa-nut which was beginning to bud; by gesticulations I made them understand that I should have liked to plant it, telling them that I intended returning to see it when it was grown; they comprehended at once, and immediately scraped a big hole in the ground with their hands, wherein I deposited the cocoa-nut.

"On the 21st, with the Dutch Commission, we went to visit a village in the small bay, which was visible from our anchorage, to which I had given the name of Bay of Expectation, from the hope I had entertained that the 'Surabaya' would have anchored there, for then we should have been at a very small distance from the shore, on which I might have landed for collecting, without loss of time, and where I might have easily sent my hunters, to whom the natives would not have dared to do any harm, the vessel being so near at hand and to their village. For, although the reception of the Papuans had been so far friendly, their intense desire to lay hold of everything which was metallic, made me suppose that if my men were to have strayed far into the forest, the natives who would have accompanied them might easily have thought proper to strip them of their implements and guns, which latter, on account of the iron, were doubtless an irresistible attraction. I collected again a few plants, but was much disappointed in not being able to visit a plantation and a field recently unwooded, at no great distance; the latter would have, no doubt, yielded treasures to an entomologist; and then I was curious to see how the natives managed to cut down such a number of trees with their rude stone hatchets. In the eastern portion of Humboldt Bay we found that there were two villages, named Mabo and Tae, the natives of which have the peculiarity of covering their nakedness with a small gourd, conveniently adapted. Towards eleven o'clock in the morning we returned on board: on approaching the steamer we soon became aware that something extraordinary had happened; the natives who were in our boats endeavoured to escape. On board the 'Surabaya' the steam was up, the guns loaded with grape-shot and run out, arms had been distributed to the sailors, and everything looked very bellicose. The cause of all this bustle was very simple: it appears that all the natives had not been equally fortunate in trading and exchanging, and those of one village had not succeeded in obtaining a single *parang* or knife; this caused much ill-humour amongst them, about twenty climbed on board the steamer, the sailors tried to make them return to their canoes, but this was not an easy task; meanwhile, one of them cast his eyes on a large iron bar belonging to one of the boats, he at once cut the ropes which secured it with his bone-knife, and, seizing it, jumped overboard; as soon as the sailors became aware of the theft they endeavoured to catch the thief, but he escaped by diving under the boats and canoes, and got safely off with his rare prize. Meanwhile, his companions, who had remained on deck, fearing perhaps for him, or wishing to protect his retreat, bent their bows and threatened to let fly their arrows on the sailors; shortly after, however, they all descended into their canoes. If, at that moment, the Dutchmen did not fire upon them, it was solely because of our being on shore at the mercy of the savages. I had been led to hope that we should have stayed a week in Humboldt Bay, but evidently that was not the unanimous desire on board, and this small fray with the Papuans was seized upon as a plausible reason for leaving at once; so that at two o'clock in the afternoon we heaved our anchor. No doubt that the natives of Humboldt Bay were bad thieves; they tried to lay their hands on every object of metal which came within their reach, they detached the copper sheathing of the steamer, got out the screws which held the paddles, endeavoured to cut the metallic ropes of the shrouds and of the lightning conductor, to detach brass handles and to cut the leaden tubes of the pumps; but we ought to recollect that any of those objects, especially those in iron, were of far greater value in their eyes than they could have been in ours had they been in gold. A single bit of iron, shaped into a rude, but for them terrible, weapon, was sufficient to raise the prestige of a whole tribe. I could not, therefore, help excusing them to a large degree, and I believe that it would not have been difficult to have made them understand that every theft would be severely punished. It was also apparent that those savages had no exact idea of the terrible effects of fire-arms, and I am sure that a few harmless experiments to that effect would have been quite sufficient to keep them in awe. I had accepted a berth on board the 'Surabaya' exclusively because I had been assured that we should have stopped a long time in Humboldt Bay, where I felt sure of being able to make interesting scientific researches, and important natural history collections; to leave after so short and tantalising a stay on so light a

pretext was a very great disappointment for me. On reflecting that Humboldt's Bay is at present one of the very few spots on the earth's surface where we can meet savages wholly uninfluenced by strangers or civilised men, and that great difficulties are against revisiting so remote a spot in a lifetime, every naturalist will pardon and comprehend my regret; however, I am under a large debt of gratitude for the kind hospitality received on the 'Surabaya,' without which I should, in all probability, have never visited that remote corner of New Guinea.

"During our short intercourse the natives of Humboldt's Bay found it so convenient to get glass beads and knives in exchange for their stone-hatchets, weapons, and ornaments, that I was not able to get many animals through them; but had we stopped a few days longer, I am sure that I should have succeeded very well, for I should have had no end of lizards and snakes brought to me, as soon as the Papuans had found out that they could easily procure in that way those large blue beads which they so highly prize. I was, however, able to get a few reptiles, some insects, amongst which *Eulophus* and *Cetonia*, and a *Mus*, which appears to be very abundant and which is, no doubt, of great interest. Amongst the trappings of the natives I recognized feathers of the *Paradisea Papuana*, of *Sericulus aurens*, of *Cacatua*, *Buceros*, and those of the *Goura Victoriæ*, or an allied and undescribed species; this surprised me, for I should have expected to have met with the crown-pigeon common on the mainland of New Guinea further west, and not with the species which inhabits the islands of Geelvink Bay. Amongst the mammals at Humboldt's Bay I recognized some *Cuscus*, the *Dendrolagus ursinus*, and a species of Phalanger, with an entire hairy tail, with which I am unacquainted. The feathers of the cassowary form one of the principal means of ornamentation; on the temple roof-sheds I observed a great number of *Calornis*, who nestle there as sparrows do with us. Of domestic animals I observed a great number of pigs, a few dogs and poultry. Of non-indigenous flowering plants I must notice the *Hibiscus rosa-sinensis* and *Immortels;* amongst the fruit-bearing plants, the banana, the giambu (rose-apple), gourds and a sapotacea, with a sweet fruit as big as a large apple, mangoes and the *Artocarpus incisa*. Other vegetable eatables amongst those Papuans are, a *Dioscoræa*, the *Convolvulus batatas*, the Kaladi (*Caladium*), the sagu, betel, betul-nut, the bamboo and tobacco.

"The colour of the skin of the natives of Humboldt's Bay ranges between the numbers 28, 35, 42, and 43 of Broca's chromatic scale. Their hair is that of the *Mafor* Papuans, but rather more woolly; its colour of a blackish chesnut-brown, but sometimes of a reddish-brown, as No. 29 of Broca's scale; very often, however, the head is plastered over with red ferruginous clay, specimens of which are in the collection I am sending home. A few were bald. The beard is frizzled, but not very long; often they epilate themselves with the two valves of a shell in lieu of tweezers. The features are mostly very marked, the nose very prominent and large; some of them had a considerable personal resemblance to the *Arfaks;* others, and more especially those with a well-furnished beard, the portraits I have seen of the natives of the Viti islands (for instance, the profile of a Vitian which you have inserted in your book on the Tasmanians). The Papuans of Humboldt's Bay have not elegantly shaped bodies as the *Mafors* of Geelvink, being more stout and muscular, with a short, thick neck; regular features are not rare amongst them, but instances of prognatism and depressed nose are not wanting. They are not very hairy on the body, but some are much so on the chest. Very few were affected with ichthyosis, *cascado*, or other cutaneous diseases, and even the much-dreaded *bebento* is rare amongst them, nor did I observe traces of smallpox. Most of them wear all their hair, spreading it out like a mop with their peculiar fork-like comb, as the *Mafors;* the younger men however shave the hair off the sides of the head, leaving a broad and high vertical crest running along the middle of the skull; a few wear wigs made of their own hair; they ornament their hair with feathers and flowers. The septum of the nose is generally perforated; in it some pass the two tusks of a wild boar, united in a manner as to form a half-moon, the points of which project upwards as far as the eyes. I have seen this substituted by a semi-lunar disc cut out of a shell, or by the usual cylindrical solid shell nose-stick of the *Arfaks*. As the latter, the natives of Humboldt's Bay also wear the forehead bandage adorned with shells, the seeds of *Coyx*, &c., called *Iueza*, and fastened behind. Some of them had the face painted black; they are very sparingly tattooed. Many wore a curious breastplate made up with boar's tusks and the red and black seeds of the *Abrus precatorius*. They wear ear-rings of divers shape, mostly made up with discs of shell and bits of tortoise-shell; necklaces, belts, and sometimes a large belt of cassowary feathers across the belly or on the loins. In the armlet they usually pass a long narrow dagger, fashioned out of a cassowary's leg bone, and spoons also of bone. The hair-mop of the women is apparently less voluminous, because it is always plastered over with red clay and allowed to retain its natural long, narrow, corkscrew-like curls, which are never undone, for the women do not use a comb; these curls (peculiar to the Papuan race) radiate from the top of the head all round, and hang down over the forehead. Girls shave the head, leaving, however, along the middle a broad band of long narrow curls; they have also the nose septum pierced, from whence hang small clusters of glass beads; to the ears are attached immense bunches of tortoise-shell rings. Many of the women show large cicatrices (of the Australian elevated pattern) in the shape of an S on the shoulders, they projected nearly an inch over the level of the skin; a few were slightly tattooed on the shoulders, or had a small circular mark in the middle of the forehead.

"Food is evidently abundant with those Papuans, both animal and vegetable; they catch fish in large numbers, in large nets made with fibres extracted from the roots of a *Pandanus* and from a species of *Bœhmeria* (?), or else with a kind of harpoon, of which I have sent home a specimen taken at Kordo. They smoke and dry fish in large quantities. The sagu is eaten in its ordinary state roasted, or else the *fecula* is extracted by beating the feculiferous tissue of the palm with a large stone hammer of a long and rounded shape, which you will also find in the collection which I have sent home. The sagu fecula is also eaten as a kind of porridge, cooked in earthen pots which the natives also manufacture. They also eat a species of soft stone or rather clay of a gray colour, as some *Kayans* do in the interior of Borneo. I shall not add anything on the artistic taste of the natives of Humboldt's Bay, for the large collection of the arms and implements I have sent home speaks for itself; I shall only remark that the greater number of their objects are ornamented, and that it is rare to find two similar implements adorned with similar designs. What surprised me is the perfect manner in which they succeed in carving, without the aid of any iron tool; it is true that I saw amongst them the broken blade of an English knife, carefully inserted by them on a wooden handle; wishing to eat a mango, the possessor of that treasure took it out of a small bag hung round his neck, and very proudly peeled the fruit for me. Their principal weapons are the bow (immensely difficult to bend, which shows the strength of their muscles), and arrows artistically barbed; I saw no spears of any kind, but plenty of bone daggers.

"Their canoes are very primitive, but unsubmergeable, excavated from the trunk of a single tree; the timber is very light; these canoes are so narrow that the legs of the rowers hardly get in, and they mostly sit astride; the sides are rendered higher by means of a narrow planking which runs all round, and which is

sewn with rotang (rattan) to the hulk. The prow is adorned with a great *rostrum* artistically carved, which represents a group of fishes, birds or other animals; on the poop is commonly a carved wooden image, often a quadruped; the sides of the canoe are again carved with figures of fish; a platform is placed across, over the two bars which support the single outrigger. On the whole these canoes are very similar to those of the Singalese we see at Point de Galle. The sail is a rectangular mat of Pandanus leaves, 3 or 4 metres in length and about 1 meter 50 in width; it is suspended from the mast, which is not placed in the middle line of the canoe, but eccentrically towards the prow, on one of the corners of the platform; it is inclined forwards, the sail remains *behind* the mast. The oars are the ordinary Malayan paddles, but without the cross-bit on the handle.

"I was unable to see any of the tombs of the natives of Humboldt's Bay, nor the way they procure fire, nor how they fell trees, nor how they lay out their plantations, nor how they fashion their stone implements, nor many other things concerning them which I should have very much liked to see, and which I might have seen had we stopped longer.

"The rock at Tobbadi is a madreporic recent limestone, but varies elsewhere; however, being occupied with other things, I did not observe them as attentively as I should have wished. I have collected a few words of the language spoken at Humboldt's Bay, but I have not at present the list by me; a few words I remember, thus cocoa-nut is *gnio*, bird is *manò*, both words of Polynesian origin; woman is *mognia*, man *har*, pig *poro* or *foro*, tobacco *sabacai*, *anuco*, *wappimé*, and knife *parang* or *siko* (iron).

"My collection of ethnological objects from Humboldt's Bay contains twenty-six stone hatchets, ten other stone implements of a cylindro-conical shape, concave on one side and provided with a handle like that of the hatchets; they are used for extracting sago; I have also a great number of bone daggers, carved cocoa-nuts, bows and arrows, earthern pots with the clay used to make them, and samples of that which is used to plaster over the hair, and of that which is eaten. I have also a wig of human hair, carved prows of canoes, wooden figures of animals, idols, dresses made out of bark, belts of feathers, armlets, bags made of an admirable kind of netting of the very strong fibres of what I supposed to be an urticaceous plant, dyed blue and red, very similar to those of the *Arfaks*, &c.

"On the 21st of December we left Humboldt's Bay, and early on the next day we anchored in a fine bay named *Sadipi Dorei*, by the *Mafors;* it used to be the eastern limit of their piratical excursions, and on the French charts is marked *Ansa Jo*. The eastern headland which limits the bay is of a red colour, through the ferruginous nature of the soil, and it is there that the portion of the coast called on that account *Tanah mera* commences. On entering we could see three inner coves. Mount Cyclops rises as a huge cone at the bottom of the bay. There are several villages, whose houses are similar to those of Humboldt's Bay, but some are rectangular instead of being square, and others are erected on dry land on low piles. The surrounding hills are extensively cultivated, with houses disseminated amidst the plantations. We found no bottom at less than 50 fathoms close to the shore, but no very great trouble was taken to find an anchorage. We were surrounded by about a hundred canoes, each containing two persons; in some were only women. All were naked, and they made signs to us to visit their villages and to go and sleep in their houses; they presented to us cocoa-nuts filled with water. Their canoes were similar to those of Humboldt's Bay, but less ornamented. Seeing that we did not anchor they evidently supposed that we did not trust them, and they then tied their bows and arrows in bundles, and laid them down at the bottom of their canoes. They were less overbearing and less adorned than the natives at Humboldt's Bay, nor were they of so dark a complexion; they resembled very much the *Arfaks*. In their canoes they had a large number of large balls of red clay, used for making pottery, and round pebbles of serpentine, perhaps for making hatchets; both appeared to be objects of trade. 'Although we were not able to land, we got so near the shore that I was able to see that the rocks which form the base of Mount Cyclops appear to be of a volcanic nature. This was to me a matter of special interest, for it gave a probable certainty to an opinion for which I was seeking proofs, viz., that the chain of volcanoes which passes through the Moluccas is *not* interrupted in Western New Guinea; but it appears that in the latter the volcanoes have been extinct for a long time. I have found volcanic rocks at Batanta and on the coast of New Guinea near Amsterdam Island; near that spot rises Mount Disceros, which has entirely the aspect of a volcano; the Island of Miosnom is volcanic, and now finding in the same case Mount Cyclops, the chain has been completed. On the eastern portion of New Guinea, from Humboldt's Bay eastwards, there are active volcanoes, as I also have been assured by native navigators. The Arfak Mountains are mostly formed of granite and mica-schists, but probably behind these are volcanic rocks, for pebbles of them have been found by me in the torrents.

"Had we found an easy anchorage in Sadipi Bay, we should have stopped there some time, and I was already flattering myself that I should have been compensated for the precipitous departure from Humboldt's Bay; but instead, for me and for the natives, who continued to follow the steamer in the hope that she was going to stop, it was to be a complete disappointment, and *Disappointment Bay* is the name which Sadipi Dorei will retain, if not on the charts, in my memory.

"The next day we crossed the Arimoa or Kumambo Islands; several canoes came out to meet us, we therefore stopped the engine; two or three approached, and I exchanged with the natives, who were in them, a few objects. They were not quite naked, wearing a belt and a rudimentary 'fig-leaf'; they had bone knives, boars' tusks, and shell ornaments. The canoes were better finished than those of Humboldt's Bay, but very similar; they wore their hair in small plaits or else in a huge mop projecting in front of the forehead. One fellow sold me the only covering he had on, and appeared to be very much embarrassed on remaining naked. But the 'Surabaya' appeared fearful to stop too long, and we were soon in motion again; nor was I able to learn more about the Arimoa islanders. We returned to Dorei with 200 tons of charcoal yet on board; certainly, some of it *might* have been used to stop a few hours in that totally unexplored archipelago. And it was the fear of remaining without sufficient coal for the return which prevented us going to the extremity of Geelvink Bay, better determining the position of the mouth of the *Mamberon* (or Ambernoh) river, visiting the Echiquier Islands and seeking better anchorage in Disappointment Bay."

I need hardly enter upon the subject of the very great importance of Beccari's observations; it is obvious enough to any ethnologist who has taken the trouble to read the above most interesting letter. I would, however, make a few concluding observations.

Beccari has evidently proved the existence in New Guinea of Negritoes, viz., dwarf negroid people to be classed with the *Ahita*, *Sámang*, and *Mincopie's* of Asia, with the *Bushmen* and Akka of Africa. I had long suspected as much, and some years back ventured to publish the opinion that the ethnology of New Guinea presented a very singular parallelism to that of Ethiopian Africa, viz., in the first case Negritoes,

negro-like (or true) Papuans, and Caucasoid or *Mafor* Papuans; in the second case Negritoes (Bushmen, Akka), true negroes, and Caucasoid negroes (Abyssinians, Somali, &c.). The fact is of much interest.

As to the importance of Beccari's discovery of Indian affinities amongst the *Mafors*, of the probable fact of an ancient Aryan invasion in New Guinea, it is very great indeed. Such a discovery sheds quite a new light on the origin of the light-skinned Polynesians. It is interesting, moreover, to recollect how many opposers Professor Huxley's hypothesis of the Indian origin of the Australians met with some years ago; I have always been inclined to think it the right one, and now Beccari's discovery renders it more probably so, although the Indians who went to New Guinea were very different from those who spread over Australia.

I have yet one bit of news to add: before I had closed this letter, Beccari himself walked into my room; he had just arrived, following close on his letter, in excellent health and spirits.

HENRY HILLYER GIGLIOLI.

THE SEA-LEVEL.

I.

UNDER the guidance of Captains Nares and Thomson on the deep-sea soundings of the 'Challenger,' with a little other assistance, we are now in a position to reopen the great cosmical problem of the sea-level. How did it come to be where it is? It is clear that all rocks formed at the bottom of the sea, and which are now dry land, "must have gained their present situation, either by the sinking of the sea-level, or by the uplifting of the sea-bottom. . . . . If the mountains had been laid dry solely by the sinking of the sea, it is difficult to understand, what can have become of a shell of water ten or twenty thousand feet deep, enveloping the whole globe."—Juke's *Manual of Geology*, 1857.

Our London Geological School has avoided the difficulty by adopting the uplifting theory—and thus accepting the present sea level as the level of all time.

If we examine what the 'Challenger' has proved to be doing now under certain laws, we shall be able to show that these laws must have produced some sinking of the sea-level, while there are no laws and no agents for the upheaval of mountains. We propose to give a modern view of mountain formation, from the address of Mr. Henry Woodward, as published in the *Geological Magazine* for December 1873. He embraces the names of many scientific gentlemen, and comes to the conclusion, "that all the phenomena of corrugation on the earth's surface, ... are to be regarded as effects of one and the same cause." It will be seen presently that two causes are given. We will place these causes fairly before the reader, we will briefly examine each section on its own merits, and then compare this mountain formation with the doctrines of other geologists.

In selecting paragraphs for quotations, we must apologise for not giving the whole; we only use that which is applicable to the subject, and hope that, in doing so, we do not lose the meaning of the authors. For the sake of future reference we prefix a number to each quotation:—

No. 1.—"We are justified in considering it (this earth) as suffering from cooling by radiation, and contracting in a more or less degree from a time long antecedent to the formation of the very oldest metamorphic or sedimentary deposits."

No. 2.—"In a heterogeneous earth, thus cooling, *areas of greater conductivity* would cool more rapidly, and therefore *contract more rapidly*, in a radial direction. . . . . The process of cooling through a stratum of water, would go on far more rapidly than through a stratum of any rocky material."

No. 3.—"Thus through the unequal contraction of the earth's crust, by which the great continental areas were originally elevated as vast anticlinals above the general ocean, the first preliminary stage for the commencement of mountain formation would be accomplished."

No. 4.—"Mountain chains are composed of enormous masses of sediment . . . . even 40,000 feet in thickness, how have these vast masses been elevated . . . . and why does the yielding to horizontal pressure take place along these lines of deposit in preference to any other? Professor Joseph le Conte suggests that the answer is to be found in the theory of the aqueo-igneous fusion of deeply buried sediments."

No. 5.—"The accumulation of sediment produces a rise of the Geo-isotherms, and an invasion of the sediment by the interior heat of the earth. Taking the increase of interior heat at 1° for every 500 feet . . . . sediments 40,000 feet thick . . . . must be nearly 800° Fahr. . . . . such a temperature is sufficient to produce aqueo-igneous fusion."

No. 6.—"With a small quantity of alkali in the included water of such sediments, all these changes would take place at a much lower temperature."

No. 7.—"This softening determines a line of yielding to horizontal pressure, and a consequent upswelling of the line into a chain."

No. 8.—"If we examine carefully any mountain range, we shall find that it is made up of masses of immensely thick sediments . . . . folded, crumpled, crushed, fissured, and faulted . . . . whilst the intimate structure of the rock has been entirely altered by having undergone *slaty cleavage*, produced by powerful pressure, perpendicular to the planes of cleavage."

No. 9.—"Suppose that a mass of sediment 10,000 feet thick, subjected to horizontal pressure . . . . sufficient to develope well-marked cleavage structure; a breadth of two and a-half miles would be crushed into one mile, and 10,000 feet in thickness would be swelled to 25,000 feet, making an actual elevation of the surface of 15,000 feet."

No. 10.—"Slaty cleavage proves, in addition, that the upswelling produced by this cause alone is sufficient to account for the elevation of the greatest mountain chains in the world."

Mr. Woodward leads the world to understand from these sentences that rocks, formed at the bottom of the sea, become dry land by the uplifting of the ocean-bed, caused by the two actions of contraction and pressure of the earth's crust in process of cooling. The theory seems to have been accepted by the Geological Association; the cloud is, however, clearing off in the horizon. At present, the words of Goethe are applicable to the situation (*Life of A. Von Humboldt*):—

"What you don't grasp is wholly lost to you!
What you don't reckon, think you, can't be true;
What you don't weigh, it has no weight, alas!
What you don't coin, you're sure it will not pass!"

We will now briefly look at the merits of our quotations.

No. 1.—How is Mr. H. Woodward justified? There is no proof that the nucleus of this earth was ever hot. Till that proof is given, no one is justified in saying that it ever cooled by radiation, or contracted in consequence of that cooling.

No. 2.—A heterogeneous earth is certainly presented to us in its stratified sediments, but the contraction is supposed to have taken place before their formation. Mr. H. Woodward knows little of the conductivity or homogeneity of the rocks on which these sediments rest. No doubt, cooling goes on rapidly through water, but in the deepest part of the ocean found by the 'Challenger,' over five miles, the temperature of 33° 9′ Fahr. gives but little evidence of any radiating heat.

No. 3.—As far as natural laws go, the great continental areas were formed by river and ocean deposits. These laws require no unequal contraction, but as the agents of the law are varied in their forces, and act on varied material, it follows that these actions are the first stage of mountain formation. They are going on now.

No. 4.—If the exceptional 40,000 feet of sediment have yielded to horizontal pressure, we must examine the cause of this pressure as suggested by Mr. Joseph le Conte. As far as natural laws are concerned, the effect of aqueo-igneous fusion in a mass must have had exactly a contrary effect.

No. 5.—The accumulation of sediments does not necessarily produce heat; gravel, sand, calcareous collections, give little or none; vegetable collections give much; animal collections give less. We find all these collections on mountain-sides. When heat does take place in collections of matter, the heat is near the centre, but the bottom is cool. Why, then, should an imaginary heat invade the sediment, and how are mountains made when the sediments are not 40 feet deep with no heat in them? As no two borings or excavations to the same depth, from the same level in different strata, give the same temperature, Mr. Woodward had no right to assume an increase of one degree for every 58 feet in depth.

No. 6.—Alkali and water produce heat anywhere; if in sufficient quantity in sediments, they may produce hot springs or volcanoes.

No. 7.—The softening of sedimental strata, whether by water or fire, necessarily determines lines of yielding; if that yielding took place in the middle or at the bottom of 20,000 feet of earth, a subsidence would seem necessary under the ordinary law of gravitation. Putting 7, 5 and 4 together, the suggestion of Joseph le Conte seems absurd.

No. 8.—We have examined many mountain ranges of many structures in Asia and Europe. We have found thick layers of sediments; they are not always crumpled, fissured, and faulted. These conditions depend entirely on the character of the foundation, as well as on the action of subterranean waters percolating through strata, or running in sheets or streams under certain areas. Slaty cleavage can only be caused by the manner of deposit; no power of pressure can produce it.

No. 9 is a very ingenious supposition.

No. 10.—Slaty cleavage proves no upswelling, but it is evidence of a relative force acting on correlative matter. When mud is left to dry in the pools, the mud left by a current will exfoliate, because its fibre or grain was deposited by a moving force. The mud left by still water cleaves or cracks, because its fibre or grain sank and formed vertically. The law in both cases is gravitation. The law holds good on all material deposited by water. When these deposits dry they contract; there is no law of nature for the upswelling of these sediments. This law was first published in *Science Gossip* (Hardwicke), in May, 1875. Mr. Kinahan, in the June number, thought it would "not be satisfactory" in all cases; he mentions several which could not, however, have existed under any other system, and then he says, "In some places the cleavage is perpendicular, or nearly so, in the pure argillaceous rocks, while as they become arenaceous it flattens, but in others the phenomena are exactly opposite." No other force except that of water could have deposited the different materials, with their grains in such opposite conditions. This will be better understood presently.

As Mr. Woodward embraced the theories of many others, whom he mentions in his address, his statement seems to show that in their opinion the mountains have been upheaved. Taken on their merits the several points connected with those theories which we have now noticed appear to have no foundation. Mr. Woodward, however, believes in his own, and in the theories he has gathered together, "for," says he, "we are privileged in forming part of a race . . . . which . . . . has achieved the power to grasp the most hidden secrets of nature; to investigate and comprehend its laws, to decipher its monuments. In the life of Humboldt, we find a few words from Goethe applicable to the situation: "Able, clever, and bold thinkers dress up for themselves such a theory out of mere probabilities; they manage to gather round them followers and adherents, and then from sheer numbers gain a literary power; the theory gets pushed to an extreme, and is carried forward with a reckless impetuosity."

A word or two from one of our most trustworthy geologists will add force to this sentence as well as to our own remarks. In his *Manual of Geology*, 1857, p. 265, Jukes says, the hypothesis of the earth having been once a molten globe, "is one with which the geologist has little or nothing to do."

In the *Introductory Text Book*, by Page, 1867, p. 25, speaking of the modifying agencies of this earth, we find, "Igneous agency as depending on some deep-seated source of heat, with which we are but little acquainted."

In the *Principles of Geology*, vol. ii., p. 211, Sir Charles Lyell wrote: "The doctrine, therefore, of the primitive fluidity of the interior of the earth, and of the gradual solidification of its crust, consequent on the loss of internal heat by radiation into space, is one of many scientific hypotheses which has been adhered to after the props by which it was supported have given way one after another."

Having quoted Sir Charles to this effect, it is fair to show that he advocated an upheaval system. In vol. i., *Principles of Geology*, p. 257, he wrote, the

Alps have gained "4000 and even 1000" feet in altitude since the commencement of the Eocene period. The Pyrenees have attained sometimes 1100 feet since the deposition of the numulitic or Eocene division of the Tertiary period." . . . . Then he tells us, "There has been no universal disruption of the earth's crust . . . . the non-occurrence of such a general convulsion is proved by the perfect horizontality now retained by some of the most ancient fossiliferous strata. . . . . In Sweden and Russia the Silurian strata maintain the most perfect horizontality . . . . so do the limestones and shales of like antiquity in . . . . Canada and the United States . . . . (but) since their origin, not only have most of the mountain chains been uplifted, but some of the very rocks of which those mountains are composed have been formed." At p. 259, "The height to which ammonites, shells, and corals have been traced in the Alps, Andes, and Himalayas is sufficient to show that the materials of all these chains were elaborated under water, and some of them in seas of no slight depth." Precisely so. In the absence of dates for these organisms, or for the Eocene period, it is fair to assume or allow that the horizontal strata alluded to were formed while the mountain chains were still under water, and while some of their very rocks were being formed. This will be better understood when we see at what varied depths contemporary sedimentary matter is now being deposited.

In support of our assertion in No. 5, we find in the last-quoted authority, p. 205: "An increase of one degree for every 65 feet in Saxony, (but) in other mines of the same country it was necessary to descend thrice as deep for each degree"—this gives 195 feet. A well at Naples gave one degree for every 208 feet, and another a mile off one degree for every 83 feet. We might multiply these differences to a long list, but these will be sufficient to prove that the warmth of wells and mines depends on the constitution of the strata.

We close the evidence against upheaval by contraction or cooling, with a few words gleaned from a very true reader of nature, Mr. Evan Hopkins in his *Geology and Magnetism*, 2nd edition, 1851, p. 25: "We have only three primary divisions, viz., solid, fluid and gaseous: we have no igneous liquids in a natural quiescent state." At p. 26, "Fire or the combustion of inflammable bodies is nothing more than a violent chemical action, attending the combination of certain substances with oxygen." At p. 112, remarking on the present theory of volcanoes and earthquakes, as "the effects of an incandescent nucleus, *i.e.*, the violent action of molten matter in its attempt to burst and break through the thin shell of the earth, it is difficult to conceive how any rational being could for one moment encourage such notions." The thin skin here alluded to has been estimated by Mr. H. Hopkins at 800 to 1000 miles in thickness.

We may now say to the mountain-builders by contraction or cooling, with Goethe (*Life of Humboldt*, vol. i., p. 193):

> "Your sin is not a modern one forsooth,
> To dream that theory may pass for truth."

We now come to facts given to us by the liberality of the British Government in fitting out the 'Challenger' for a scientific voyage, under the command of the best officers available, assisted by a well-selected scientific staff.

These facts place before us a series of operations going on at the bottom of the ocean under the guidance of certain laws. These laws began with the beginning of the three elements—air, water, and earth. The works now going on have therefore continued from the beginning. The only difference is that the materials used in the works have changed.

H. P. MALET.

(To be continued.)

EXHIBITION OF SCIENTIFIC APPARATUS AT SOUTH KENSINGTON.

THE number of instruments of novel design or invention, connected with the province of geography, in the Loan Collection, is not great, nevertheless there are some worthy of note. We shall offer no apology for introducing a few of comparatively ancient lineage, and whose history is well known to the scientific world, or rather that world interested in geography and its branches. But that world is far more limited in its extent than is generally supposed; and we certainly should hesitate to broach the subject of the measurement of an arc on the meridian, or the projection of a grand trigonometrical web, in a mixed company. Yet there are few pursuits that require more skill, more study, or more constant perseverance and thorough hard work than that of conducting and projecting a trigonometrical survey, and when prosecuted on a large scale it may be compared to chemistry in its dealing with infinitesimal quantities and proportions.

We have here Colonel Colby's compensation bars, an instrument of enormous value, and although it cannot be so well seen in the way in which it is exhibited as to be understood, it is still worth an inspection and due consideration, when we remember that to this instrument we are indebted for the measurement of the two base lines, the one on Salisbury Plain, and the other in Ireland, on which the whole trigonometrical survey of the kingdom depends; in other words, if any inaccuracy in these base lines exists, notwithstanding the perfection and excellency of any other instrument used, an error would run through the whole, extending in a compound ratio to the distance from the base, until the survey would be comparatively worthless.

Previous to the introduction of these bars various modes of measurement were tried, the most reliable being that with a glass rod, the temperature of which was noted the moment it touched the earth, and the correction for elongation or contraction by temperature allowed; still, as may naturally be supposed, there were difficulties even in this apparently exact method, and all having reference to temperature; but by the skilful appliance of two metals of unequal expansive qualities, this difficulty has been overcome in Colby's compensation bars.

These bars are of brass and iron of equal length, united in the middle, having an apparatus attached to the ends, which, by means of microscopes, enables the observer to mark with extreme accuracy a length or distance irrespective of the element of temperature, for as the combination of the two metals has been used

to measure temperature as a thermometer, it may readily be understood that they can be so arranged as to counteract the effect of temperature acting on the one and the other when used in conjunction.

Another instrument that has done good service in its time, and is still capable of doing more. This is Ramsden's 36-inch theodolite, with which the great triangulation of this kingdom was measured, and connected with the triangulations of France and Belgium. It is asserted that the extent of error of a *single* observation, under favourable circumstances, will not exceed about eighteen seconds. By means of the heliostat, observations have been made with the Ramsden theodolite at a distance exceeding a hundred miles, and on one occasion an angle was observed at a distance of one hundred and twenty miles.

Of the great theodolite constructed by Troughton and Simms, from the design of the late Lieut.-Colonel Strange, for the Department of the Great Trigonometrical Survey of India, we have only photographs exhibited, which give but a very inadequate idea of the instrument itself.

After these larger and more famous instruments, it may appear almost needless to mention the smaller theodolite of the same talented mechanician, Ramsden, and the 24-inch theodolite of Troughton and Simms, both exhibited at the collection. As the larger theodolite of Ramsden was too heavy for many purposes, the smaller one cannot be considered of less importance in its own sphere of conducting the internal or lesser triangulation.

The Zenith instruments of the Astronomer-Royal, and Wardemann of the United States, are also exhibited. That of Sir George Airy has been employed in the determination of the latitude of many places in connection with the Ordnance Survey.

All these instruments may be aptly termed triumphs of mechanical skill and workmanship.

Of smaller theodolites, their name is legion. Noticeable among them are several by foreign makers. In many of these, the graduated horizontal arc is covered, showing no more then is necessary for reading the vernier. For some reasons this arrangement is good, but when observing in a sandy country, the fine blowing sand cannot so readily be removed, and the constant grit injures the arc to the great detriment of the instrument. Hahn, of Cassel, exhibits two instruments combining some novel improvements. Metford's improved theodolite, cut to thirty seconds, is well deserving attention, and a good practical 5-inch theodolite may be seen in the case containing instruments furnished by the Hydrographic Department of the Admiralty.

Eckhold's Omnimeter combines the usual theodolite with a base measure, but the inventor is most unfortunate in the name he has given the instrument. Omnimeter means something or nothing. It is not an omnimeter, and the name is misleading because it gives rise to the supposition that it is not a theodolite, whereas it is a theodolite and a level, as other theodolites. The adaptation for measuring the angle of a short known base, as of a 10 or 20 foot board, and at once reading the distance in linear measurement, is, in reality, the novel part of the design, and thus it does the work of a good Rochon micrometer telescope. The vertical arc is a circle enabling a high altitude to be observed. The instrument can be used as an alt-azimuth or a transit instrument.

The Chrono-Goniometer, for finding the time at sea and the latitude, by two altitudes of the sun taken at any time, the invention of the talented Superintendent of the Magnetic Observatory at Lisbon, Don João Capello, is, we fear, too complicated for general use at sea, and may be considered as one of those philosophical instruments that demonstrate the mechanical and theoretical talent of the inventor, rather than an invention of practical utility. When we state that five movements are required to solve the problem, it will be a consideration as to whether the usual exact logarithmal calculation is not preferable to the mode of inspection by a rather complicated instrument. The instrument consists of a metallic arc of nearly 260° connected at the ends by another arc of the same radius, on which connecting arm the centre point of the outer arc is fixed. These arcs are graduated. Movable round the centre is an index bar representing the horizon, and movable on this index arm there is a rectangular arm terminated by a microscope. By the movement of these arms the various data of declination, altitude, &c., can be so arranged as to give the result desired. An explanation of the method could not be made intelligible without a diagram.

The Harmonic Tide-Calculating Machine is the invention of Sir William Thomson. A distinction must be made between a common *tide-gauge* and this machine. A *tide-gauge* produces a curve on a sheet of paper by means of the vertical motion of a float on the tidal water, and a horizontal movement (produced by clockwork) of the paper. From this curve the past heights of the tide may be easily found, and laws deduced by which in the ordinary way the times of high and low water may be calculated. But it is obviously important that the times of intermediate heights of the tide should be known beforehand, and it is at this object that "The Harmonic Tide-Calculating Machine" aims. The curve spoken of as being produced by a tide-gauge is the resultant of the joint actions of the sun and moon, and its change from day to day is consequent upon their varying *angular* distances from each other, and is affected by their varying distances from the earth.

By means of the proper mathematical reduction, the mean values of the range of the tidal curve and the time of its maximum can be determined for both sun and moon. There can be found also the values of the inequality or variation from these mean values, for the ellipticity of the orbits of the moon and sun (or more correctly earth), and also for the inclination of these orbits to the earth's equator. There are also other inequalities, which, being small, need not here be dilated on. All these component parts of the complete tidal curve, arranged from right to left in order of magnitude, are represented by cranks of variable throw which are moved by wheels set round two sides of the triangular frame of the machine. A chain fastened at one end is passed up and down over all these cranks, and the summation of their effects—in other words, the predicted tide curve—is traced by a pen on a continuous roll of paper.

Reviews.

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THE MOON.*

PERHAPS, of all celestial objects, the moon may be truly said to be the most interesting, and in all ages to have occupied the closest attention of observers. Situated as it is, in comparative proximity to the earth —being only 240,000 miles distant—the moon can be very closely scrutinised, and astronomers have, in modern times, been enabled, with the superior optical appliances now in use, to construct accurate maps of the lunar surface. Works on selenography must be at all times interesting, and Mr. Edmund Neison, in his elaborate book, has entered into the subject most fully. In the volume just published, he treats of the present condition of our satellite with considerable comprehensiveness, and supplies a want which has long been felt by English selenographers. Although mainly intended for the use of astronomers in the wide sense of the term, Mr. Neison has written his book in language which will make it interesting to general readers. Commencing with the "motions, figure, and dimensions of the moon," he goes on to describe its physical constitution. From it we are led to believe that there is a very considerable resemblance between the materials of the moon and our earth, and the telescope plainly reveals many striking features common to both. Messrs. Beer and Mädler, however, would seem to hold a different opinion. They tell us that "the moon is indeed no copy of the earth, much less a colony of the same," containing neither oceans, seas, nor river-systems, with the accompanying formations, but a desert containing innumerable craters and surface irregularities. Of them, however, Mr. Neison states, "they possessed very inadequate means for the study of the minute details on which the recognition of its true character must be based," and their opinion must now be received with a certain amount of modification; for upon a closer investigation of lunar formations with adequate means, he tells us, the remaining impression as to the dissimilarity between the lunar configurations and the surface of our earth, loses much of its force, and many points of resemblance are apparent.

The existence of great masses of water in the moon was for a long time firmly believed in, and Hevelius, one of the earlier astronomers, consequently gave the darker portions, visible to the naked eye, the names of seas, as *Mare Crisium*, *Mare Imbrium*, *&c.* These so-called seas, although still retained in lunar nomenclature, have been found in the telescope to consist of low-lying lands, intersected here and there by small ridges, which would quite upset the theory of their being of an aqueous character; and although there are certain minute portions of the moon which seem to consist of water, the idea of any large seas or lakes, similar to those which exist on our earth, must be abandoned. With regard to a lunar atmosphere, there appears to be a difference of opinion, and although many astronomers are agreed that one exists, it must be of considerable rarity. The most delicate experiments made for the purpose of determining its presence fail to show any sensible refraction, for during an occultation of a star, its disappearance behind the moon and its reappearance are instantaneous—phenomena which could not take place were the lunar atmosphere of any considerable density and consequent refractive power. But whatever may be its nature, nothing similar to *clouds* exist in it, otherwise they would be perceptible in the telescope; and hence we may reasonably conclude, that neither hail, rain, nor tempest disturb its serenity, for all the parts present an uniformly clear and calm aspect.

Mr. Neison's description of the "lunar formations" comprises a very interesting portion of his book, and shows that a great variety of surface exists on the visible hemisphere of our satellite. The formations, he tells us, may be divided into three great classes, under which the whole diversity of the lunar surface can conveniently be grouped. The first class, occupying more than half the disc of the moon, is again divisible into two great sub-classes of dark and light plains—the first including the seas, with those smaller formations to which the terms "Palus, Lacus, and Sinus have been applied;" but in the latter class the formations have received no distinct name, and are seldom possessed of as defined borders as the former. The *rill* or *cleft* formations are amongst the most interesting on the moon. Mr. Neison tells us they are "long, narrow, deep ravines, canals, or cracks, usually straight, often branched, sometimes curved, and not unusually intersecting one another, extending for considerable distances at times, generally traversing without interruption mound, ridge, or crater-pit in their path, though occasionally deflected by some object or interrupted by others, when it recommences beyond and proceeds as before." Being very difficult to distinguish, they are at the same time one of the most unaccountable of the lunar formations. First discovered by Schröter, their number was afterwards increased by the observations of Lohrmann, while subsequent observers have raised the total number to nearly one thousand. Nothing appears to be known with certainty as to the true nature of these so-called rills or clefts. They have been supposed to consist of cracks or fractures on the surface of the moon, but they appear more nearly to resemble the dried beds of rivers or watercourses, although in many respects their appearance does not accord with such an origin. A marked feature is their length, in some cases extending for nearly 300 miles. Another remarkable class of formations are those termed *craters*, from their resemblance to volcanic craters in existence on our globe, and indeed a vast extent of the lunar surface is dotted with them. They generally appear of a circular shape, whilst in the centre "rise one or more mountain masses, whose peaks never reach the altitude of the surrounding walls, with which they are not, as a rule, connected."

After a description of the various aspects assumed by the lunar formations, Mr. Neison devotes an interesting chapter to lunar history, and commencing with the earliest recorded observations—those of the Chinese—who appear to have been far advanced in the science of astronomy, carries us on, step by step, to modern times. The earlier observers had only the naked eye to guide them, and until the time of Galileo—one of the inventors of the telescope—lunar observations, that is observations of the surface, were

* *The Moon, and the condition and configuration of its surface.* By Edmund Neison, F.R.A.S. London (Longmans), 1876.

of course of a very imperfect nature. Galileo may be regarded as the first astronomer who superseded mere conjecture by facts, and his telescope showed the moon's surface to consist of a mountainous region, very similar to portions of the terrestrial globe. Since his time, with the gradual improvements made in the telescope, the number of observers has greatly increased, and the most interesting details connected with selenography have been brought to light.

Whether the moon be inhabited or not has been a matter for investigation and conjecture from the earliest times. Many have been the opinions on this interesting question. Whilst some astronomers have doubted the fact, others have given the belief their support, and observations have been made with the view to determine it. Various minute physical changes of lunar formation have indeed been observed, and their occurrence has been rendered certain by the results obtained by Lord Rosse, who, with the powerful optical means at his disposal, has been able to detect variations on the lunar hemisphere which seem to show that in the moon, as on the terrestrial surface, changes are constantly occurring. Although the moon may not be possessed of an atmosphere of any considerable extent, it must still be a question whether there may not be sufficient moisture in certain favourable positions to support vegetation of various kinds; yet hitherto, Mr. Neison justly remarks, "little evidence has been found to connect in any way the periodical variations in tint," detected on the lunar surface, "with processes of vegetation," so that however interesting the subject may be as to the moon being a habitable globe, we cannot determine the fact with any degree of certainty. Were the power of our telescopes increased, so as to enable us to take a very minute survey of the lunar surface, the question might perhaps be set at rest, but nature seems to have set a limit to the size of an instrument to accomplish this; and were it even possible to construct an object-glass or speculum sufficiently large to bear the necessary magnifying power, it would be almost too cumbrous to apply to celestial investigations.

Besides several very beautiful pictures of lunar formations, Mr. Neison gives us a most elaborate map of the moon, drawn to scale, and with every minute crater and feature accurately marked, the whole being the result of many years' labour. A very full description of the different maps occupies the most considerable portion of his book. We are also made acquainted with the various observations made on the lunar mountains by different astronomers, together with the heights of the peaks, some of which, as, for example, a mass of mountains projecting into the *Mare Crusium*, attain an altitude of 10,966 feet, while some rise even higher than this, reaching a height of 16,000 or 17,000 feet. Although a small globe compared with the earth, it will be seen that the moon, in respect of its mountains, can vie with some of those on the earth, while in peculiarity of form there are very few terrestrial ranges which can compare with the lunar mountains. Ring plains abound on the lunar surface, and appear to be a marked feature on the face of our satellite.

To the astronomer, in the wide sense of the term, the book before us must prove a very considerable aid in the study of selenography, as Mr. Neison has therein embodied the results of investigations by which he has contributed greatly to the mathematical portion of the science, more especially by the great accuracy and minuteness with which he has determined different positions on the moon's surface. To the younger aspirants for fame in the science of selenography, and who may be possessed of only moderate telescopes, that is of three to four or five inches aperture, Mr. Neison's efforts to further the study of lunar formations will be fully appreciated, for he is distinctly of opinion that the possession of a very *large* instrument is by no means a *sine qua non* in such investigations. Indeed, small telescopes will, on many occasions, prove more suitable to the study of celestial scenery than large ones, as we have frequently found: the state of the terrestrial atmosphere is very often a serious drawback to the clear definition of celestial objects, for the late Sir William Herschel remarked that in this country there were scarcely more than one hundred hours in the course of a year (in his experience) which were perfectly adapted for astronomical observations.

In taking leave of Mr. Neison's book, we must congratulate him on the very able manner in which he has dealt with his subject; and we are sure that the time and labour which he has devoted to the work in question will meet with the full appreciation of all who are interested in the study of selenography.

MY CIRCULAR NOTES, by *J. F. Campbell.* Macmillan & Co., 1876.

A SOMEWHAT bewildering query intruded itself upon the present writer, after perusing many of these notes, viz., in what class of letter would Charles Lamb have classed them? We by no means intend any implication that they would have been ranked by him among the ghost-like unrealities of testimonials, complimentary addresses, letters from schoolboys to home which have been looked over by the master, *et id genus omne.* Of their solid realism none can doubt; but the gentle critic who so sweetly doubted what he could send to Australia whose interest could keep fresh through so long a voyage, and feared lest a criticism on last night's play might haply reach the recipient some months later and on a Sunday morning, would have trembled before a globe-trotter, who, beginning from the east his flaming road, circled the world in thirteen months, displaying the most Parthian energy in correspondence that we remember ever to have encountered.

Not much novelty can be imparted even by this keen observer to so well-worn a subject as Niagara. The Falls are becoming sadly vulgarised when cabmen out of work cross them on a slack rope daily, and even a dog (from whom better things might have been hoped) had the conscience to return none the worse for going over them. Wonderfully vivid are our author's notes upon the gigantic trees and all the manifold wonders of the Yosemite Valley, the wild mixtures of all races that jostle in Oregon; perplexing to a mere student under Sedgwick and Lyell is his exhausting habit of clutching some huge rock to compare it with some congener at the other side of the world, till the bewildered reader rejoices to find the traveller fairly aboard an American steamer crossing the Pacific, and rejoicing, as the crew were mostly Chinese, that the ocean did not just then belie its name. For some space, at any rate, the very stones could not prate of his whereabouts.

At Yokohama no long stay was made, and wisely too, for Yeddo was near; Enoshima (well compared to the islands near Naples), with its glorious bronze Buddha, for whose memory we look with reverence on even his baby brother at South Kensington, and above all, the

journey to Mianoshta. The author's own words are too simple and veracious to bear alteration. "Forty miles of very good road, with houses in sight on both sides, all the way, as thickly peopled as a London suburb, with all the people working in the open air in any dress that happened to suit them, or in no dress at all." To this scene, as gazed upon by the traveller in his *one-man-chay*, we would only add the frequent temptation of water-melons cut in slices, their crimson black-spotted flesh sparkling under a constant shower from a small fountain. Even in this small matter the inborn artistic feeling of the Japanese shows itself. Differing from the Chinese, who, though of untiring industry, seem to love ugliness *pur et simple*, the most fantastic groups of the Japan artist have a wild fun, always tempered by conscious ability, and never overstepping the modesty of nature. But æsthetic talk is out of place here. It seems scarcely possible to believe—yet our author will have us to do so—that the wondrous Lacquer Bridge of Nikko and the Tombs of the Tycoons are already becoming even as common as the Tombs of the Kings in hushed old Egypt. If so it be, we pray that some artist will haste to record a scene almost as mysterious and, by reason of its vegetation, infinitely more picturesque than the Theban Valley.

Space fails us to tell of the amusing adventures of Mr. Campbell in Java, or of his pilgrimage to witness the print of Adam's Foot, which he has figured for our edification, and which, by the way, proves our progenitor to have been unmistakably a negro. All who have accompanied his wanderings will be glad to find that far though the cry be to Lochow, this worthy scion of the ubiquitous clan Campbell got safely home again to the cradle of his race.

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BANNÚ, OR OVER THE AFGHAN FRONTIER. By *S. S. Thorburn*. (Trübner & Co.)

THIS is the second book that has been published on the district of Bannú and the Afghan frontier. The first was written by Major Herbert Edwardes on his return home in 1850, and *A Year on the Punjab Frontier* was the most popular work that ever appeared on an Indian subject. More than a quarter of a century has since elapsed, and Bannú, which was formed into a district in 1861, is now a regular division of the Punjab. Mr. Thorburn, the settlement officer, now gives us a complete and most valuable account of the geography, history, and folk-lore of the district; with an interesting explanation of the revenue system and the nature of the land tenures. The details of a revenue settlement are generally dry, but they are not so in the hands of Mr. Thorburn. His Chapter vi., though furnishing full information on tenures and the method of settlement, is as pleasant a piece of reading as is to be met with in what are professedly far lighter books of travel. The second part of the customs and folk-lore of the people of Bannú, and on their superstitions, is as valuable to the ethnologist as it is interesting to the general reader.

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THE DISTRICT OF BAKARGANJ, ITS HISTORY AND STATISTICS. By *H. Beveridge, B.C.S.* (Trübner, 1876.)

THE formation of the Deltas of the Ganges and Brahmaputra, and the gradual movement of the rivers, are phenomena which have received much attention from Mr. Fergusson and other students of physical geography; and, as contributing some additional information with reference to this subject, the present account of Bákarganj, a Bengal district, embracing the right bank of the Megna and part of the Sundarbans, is very welcome. But Mr. Beveridge, whose name is already well-known from his father's excellent *History of India*, does not confine himself to the physical features of his district. He describes the land tenures, and gives an account of the people, the productions, and the various branches of civil administration. The book is one of permanent value; and the chapter on the Sundarbans and of their inhabitants is particularly interesting. Mr. Beveridge speaks strongly in favour of an increased employment of natives, urging that Bengal cannot afford to be administered by foreigners. He thinks that nearly all the judicial offices might be held by natives. They will work for less pay than Europeans, and their knowledge of the language and customs of the people, and their not requiring long furloughs to Europe in order to recruit their strength, give them an immense advantage over foreigners. He adds, "I do not overlook the advantages possessed by Europeans, but I think that none of them counterbalances the superiority of the Bengalis in the above-mentioned points."

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THE INDIAN FORESTER: A quarterly magazine of Forestry, edited by *W. Schlich, Ph.D.* April 1876. Vol. I., No. 4. (Calcutta, 1876.)

THIS magazine is now, we hope, an established success; for certainly each number improves as regards the value and interest of the articles; nor does there appear to be any want either of contributors or correspondents. The present number opens with a continuation of the paper on "Bamboo and its Uses," by S. Kurz; which will prove useful to Mr. Routledge in his investigations relating to the steps to be taken for obtaining large supplies of bamboo for paper stock. Then follows the valuable report of Mr. Cross, on his expedition to obtain plants of the Indian-rubber tree (*Castilloa elastica*) from the forests of the Isthmus of Panama. The article on the "Special Survey Branch" of the Forest Department enforces the importance of demarcation and of framing working plans for the different forests, in accordance with their capabilities. But at present, the writer deprecates any great outlay on the new branch, and urges that we should be content with such inexpensive surveys as are sufficient for our present needs. He looks upon valuation surveys of standing stock as one of the most urgent requirements.

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THE DUTCH IN THE ARCTIC SEAS, by *Samuel Richard van Campen*. Vol. I. A Dutch Arctic Expedition and Route, being a Survey of the North Polar Question, including extended consideration for the renewal of Dutch Arctic Research. (London, 1876.)

MR. VAN CAMPEN is a native of New York who takes a deep and romantic interest in the land of his ancestors, and he is, above all things, anxious that Holland should revive her maritime greatness by despatching an Arctic expedition of discovery. We have, in this journal (see *Ocean Highways* for March 1873, p. 388) and elsewhere expressed the pleasure which all English geographers will feel when they see their brethren of Holland resuming their proud old position among Arctic explorers, and we have suggested that the direction such future efforts should take might be that of Spitzbergen. No one who is at all acquainted with the affairs of the Netherlands, during the last few years, can have any doubt of the old spirit which inspired Vlamingh and Barentsz having been inherited by the brother-officers of Jansen and Beynen. But we have refrained from recurring to the subject, because we were confident that our Dutch friends had not lost sight of it, and that it would be taken up in their own good time. Meanwhile Holland is well occupied with gigantic public works at home, and with a useful expedition of discovery in Sumatra. We, however, welcome Mr. Van Campen's volume as a serviceable review of what has recently been written on Arctic exploration; while we look forward with far more interest to the appearance of his second volume on Dutch Polar voyages, which he announces.

Log Book.

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News from Stanley.—The *Daily Telegraph* announces that letters have been received from Mr. Stanley dated July 29th and August 15th, 1875, and January 18th, March 26th, and April 24th, 1876. After the departure of Linant de Bellefonds, Stanley returned to his camp at Kagehyi. He narrowly escaped destruction during this voyage owing to the treacherous attack made upon him by the inhabitants of Bumbireh Island. Before breaking up his camp he paid a visit to the Island of Ukerewe and then returned in canoes to Uganda, severely punishing the Bumbireh people for their treachery. On the 15th of August, 1875, he was at Dumo, a town or district on the western shore of the lake, between Sasse Island and the Kagera River. From Mtesa's capital Stanley then crossed over to the Albert Nyanza, attended by 2000 spearmen of Uganda. He traversed Unyoro, passed the cold uplands of Mount Gambaragara, inhabited by a strange tribe of pale-faced people, and reached the lake at Unyampaka. On the 18th of January, 1876, he was back at Mtesa's. He then travelled to the south, explored the Kagera River, the lake to the west of Werahanje, the capital of Karague, and the hot springs of that country. The letter in which he describes these explorations is dated from Kafurro,* a village near Werahanje.† He then travelled towards the south, and the last letter received from him is dated from Ubagwe, about half way between Karague and Unyanyembe. Mr. Stanley proposes now to proceed to Ujiji and thence to explore the country between the Tanganyika and the Albert Nyanza.

The Norwegian Deep-Sea Sounding Expedition.—The Expedition for carrying deep-sea soundings between Norway, the Shetlands, the Faroes, Iceland, and East Greenland, originated mainly at the instance of Professors H. Mohn and G. O. Sars, who, in 1874, memorialised the Minister of the Interior, M. Vogt, on the subject. At the recommendation of the Government a sum of 4500*l.* was voted by the Storthing for the first year (1875), and 3200*l.* for the second year (1876). Captain C. Wille was appointed commander, and sent officially to England in order that he might confer with Captain Nares (whom he was lucky enough to see the day before he sailed with the Arctic Expedition), Captain Evans, Dr. Carpenter, Mr. Gwyn Jeffreys, Mr. R. H. Scott, of the Meteorological Office, and the Authorities at Kew Observatory. From these gentlemen he obtained much valuable advice. A good sea-vessel called the 'Vöringen,' of 400 tons burthen, was selected for the expedition. It is intended that she shall extend the work of the 'Porcupine' in a north-easterly direction from the 'Lightning' Channel, between the Shetlands and Faroes, and after calling at Thorshaven (in the Faroes), that she shall proceed to examine the bank between Faroe and Iceland and its slope towards the Arctic Sea. At Reykiavik magnetic observations will be made, and from a point N.E. of Iceland a line of soundings is to be run to the Norwegian coast north of Drontheim. In this manner it is hoped to explore all the channels from the North Atlantic to the Arctic Sea, including a good portion of this sea itself as far north as Spitzbergen. The Expedition will be absent during two or three summers, from June to September. News has reached Bergen that it had arrived at a point about 25 miles west of the Shetlands, and had already come across marine fauna of an Arctic type.

New Maps of Northern Persia and of Afghanistan.—Captain the Hon. G. C. Napier, whose interesting exploration of Northern Persia in 1875 formed the subject of an article in our number for August 1875, is engaged on a new map of the Persian frontier, designed so as to illustrate his route. It will introduce various modifications into the topography of the region, as delineated by Baker and Gill, more especially as regards the mountain ranges, and will show the line of a perfectly new route across the Juven Valley, north of Sabzawâr. Another interesting point in the map to which Captain Napier draws attention is the question of the true position of the fort of Kara-Kaleh in the Atak, which the Russians have shown themselves to be very anxious to secure. Markosoff's survey places this fort a very few versts south-east of Kizil Arvat, but Captain Napier's information leads him to place it much further south. Its occupation by Russia might thus prove to be a serious matter for Persia.

Major C. W. Wilson, R.E., late Director of the Topographical Department of the War Office, is on the eve of completing a new map of Afghanistan. It will embody all existing material, and much which has hitherto been unpublished. Both these maps are being prepared for the Secretary of State for India.

Exploration in Sumatra.—An expedition is about to be despatched, under the auspices of the Dutch Geographical Society, to explore and lay down the course of the Jambi River, to investigate the question of the possible communication between the highlands of Padang and the east coast of Sumatra by means of that river, to explore the adjacent districts, and to penetrate into the valleys of Korinchi, Serampei, and Soengeitenang, which have never been satisfactorily examined. By this means a considerable blank space on the map of Sumatra will be filled in. A son of Professor Veth, the President of the Dutch Geographical Society, a young engineer, aged 26, who has recently been employed on the St. Gothard Railway, will accompany the expedition.

South American Scholarship.—Dr. Don José Gutierrez of La Paz is engaged in compiling a new grammar and dictionary of the Aimará language. Dr. Gutierrez is a scholar of no mean acquirements, and is perhaps the most learned man in Bolivia. Herr Eugene von Boeck has nearly completed a dictionary of the Quichua language, at Cochabamba, which will also be a valuable contribution to South American philology. Mr. T. H. Moore, who was at Calama in the desert of Atacama, in 1874, succeeded in making a valuable collection of words of the Atacameño language, a most interesting branch of the Quichuan group. Unfortunately he was unable to go to San Pedro de Atacama, the only place where Atacameño is a living language.

Peruvian Geography and Statistics.—Don Manual Pardo, the President of Peru, has dedicated

* Kafurro (Kufaro) is a village near Werahanje, the capital of Karague. Ubagwe is identical with Bague, in lat. 5° 30′ S.

† See our maps in the *Geographical Magazine* for December 1875.

to the Royal Geographical Society a map of Peru engraved at Lima, under the superintendence of Don Antonio Raimondi, which is designed to show the political divisions and the places known at the time of Cieza de Leon in 1553. On this map the line is shown dividing Nueva Castilla and Nueva Toledo, the dispute respecting which gave rise to the feud between Pizarro and Almagro. The new census of Peru was taken last May, under the orders of Señor Pardo.

Dr. Schweinfurth's Retirement from the Presidentship of the Egyptian Geographical Society.—We regret that we should have made an erroneous statement in our number for July, p. 191, with reference to the retirement of Dr. Schweinfurth from his position as President of the Egyptian Geographical Society, which we had been informed was owing to a misunderstanding between him and the Chief of the Egyptian Staff, General Stone, with reference to the direction of the scientific explorations to be set on foot by the Khedive's Government. Dr. Schweinfurth's resignation was entirely in consequence of his intention to accept a professor's chair in the University of Leipsic. As regards the direction of scientific explorations, General Stone never aspired to control any, excepting those belonging to the General Staff of the Army.

Correspondence.

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THE WORLD'S FUTURE COAL DEPOT.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—Allow me to correct some errors in the paper "The World's Future Coal Depôt," by D. Ker, in the March number of the *Geographical Magazine*. The author, first stating that there are two principal coal-basins in Russia, the "Moscow" and the "Don," is very confident that they will supply the world's coal in future. As to the first, though the carboniferous formation occupies a very large area, the coal-fields giving any promise are all found south of Moscow, in the governments of Riazan, Tula, and Kaluga. Nearer to Moscow the depth at which the coals are likely to be found is so great that there is scarcely a hope of their being worked at any time. The coal-mines of the governments of Riazan, Tula, and Kaluga have certainly a great future before them, being situated in the most populous region of Russia, near the principal railroads and factories, but as to the possibility of their being carried by rail to the German frontier, or even supplying the wants of England, it is a fallacy.

The distance from Kaluga, the most western town in the vicinity of the coal-mines, to Königsberg, the nearest German sea-port, is 760 miles, and from Skopin, near which the most promising coal-fields are found, 938 miles. Even at the extremely cheap rate of one penny a ton a mile, the carriage from Kaluga to Königsberg would be 3*l.* 3*s.* 4*d.*; from Skopin to Königsberg, 3*l.* 18*s.* 2*d.* Add to this the cost of extraction, the carriage from the pit's mouth, and the sea voyage, and calculate what a ton of coal would cost at London. The only means of carrying coal from the Moscow basin even to the Baltic would be improved rivers and canals, on which the cost of carriage could be reduced to a quarter of that by rail.

The Don basin has much more chance of supplying some foreign markets, at least on the shores of the Mediterranean and Black Seas; then, again, Mr. Ker's suggestion as to the transport by rail to Sevastopol does not hold good, as the shortest distance would be 470 miles, which at one penny a ton a mile, would amount to 1*l.* 19*s.* 2*d.* It must be added that freightage from the Russian harbours, especially from the Black Sea, is high, because the export consists of bulky agricultural produce, so that the ships often come in ballast. Once the coal-mines are worked on a large scale, English coal will not be imported, and this was till now the only bulky import, and thus the freight by sea must rise. This will certainly check the export of Russian coal. The railroads are in a similar position; they carry much more freight to the harbours than from them, and thus have many empty carriages to carry back.

Thus, cheap water-carriage is seen to be necessary to allow of an export of coal. If a canal could be made from the Donetz to the Dneiper, near Ekaterinoslav, it would allow of the Don coal reaching the Black Sea at a price probably not above 15*s.* to 20*s.*, all included, and thus allow of its exportation.

Mr. Ker further mentions the anthracite of the governments of Kharkoff and Ekaterinoslav. There are no coal-mines worked in the first of them, and in the second it is not anthracite, but bituminous coal.

The government of Kiev contains no anthracite or bituminous coal, but lignite, which has been worked for some years. As to its exportation to Western Europe, the cost of transportation would forbid it, if ever lignite was equal to good bituminous coal, which is not the case.

Another calculation of Mr. Ker is curious enough. He states that, at the present state of felling, the forests of Russia will be exhausted in fifty-four years, forgetting only to mention that forests do grow again, not only when care is taken to promote the growth of trees, but when left alone.

I remain, Sir, yours respectfully,

A. WOEIKOF.

SINGAPORE, *June 6th*, 1876.

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FORMER PHYSICAL ASPECTS OF THE CASPIAN.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—I read with interest Major Wood's paper "On Former Physical Aspects of the Caspian." Whatever can be said on the principal theories of the author, as to the causes which led the Oxus to abandon its ancient bed and to flow towards the Aral Sea, there are in the second part of the paper hypotheses which call for a refutation.

Major Wood says that the evidence he has given on the former low level of the Caspian waters would be of little value, if he could not prove that in comparatively recent times, even in the fifth century of our era, the Volga, or a large part of it, flowed into the Sea of Azov. He then says, "northward from about 46° there extends along the right banks of the Volga a nearly continuous ridge, which varies in height from 220 to 1000 feet above the level of the sea. At Simbirsk, however, there is in this ridge a gap, by which the Volga stream might formerly have found its way into the Azov through the marshy valley of the Choper, which is an affluent of the Don."

There is no gap whatever, neither at nor near Simbirsk, and even if there was, it would not have enabled the Volga to flow southward. The whole slope of the country between 53° and 56° N. latitude is northward, and the Sura and Suraga flow from south to north, the latter approaching the Volga at about two miles near Simbirsk. Between about 52½° and 53½° there is an unbroken plateau stretching a long way to the west, and generally 800 feet or more above the sea-level, except where scooped out by the rivers. The Choper rises south of this plateau, and about 2° south of Simbirsk. The whole hypothesis is entirely unsupported by facts. If Major Wood had only looked at a good map of these countries, as, for example, the topographical maps of the Staff-General, or even the map of Eastern Europe in Stieler's Atlas, he would certainly not have erred so much.

It is, perhaps, possible that some part of the waters which now reach the Volga might have flowed to the Don, but a very small part, and this in the basin of the Oka. The Zua, a tributary of the Oka, rises south of Tambor, between the Voronesk and Vorona, two tributaries of the Don, and the intervening country is low, so that the Zua might have flowed to the south formerly.

Besides the physical grounds against the flow of the Volga into the Sea of Azov, the hypothesis of Major Wood is contradictory in itself. He admits, at the same time, a much lower level of the waters of the Caspian and consequent smaller extent of this basin, and a much higher water level of the Sea of Azov, considerably above 24 over the present level, and also admits that the surplus of this water flowed through the Manytsh to the Caspian. Now what would be the effect of such a flow of water, certainly to raise the level of the Caspian even above the present level and thus to increase the area of this sea above what it is now, as Major Wood does not admit of elevations and depressions of the land since that time.

Further, Major Wood states that the Bosphorus could carry 34,000 cubic yards per second out of the Black Sea, if there was no water flowing in the opposite direction, but that Elisée Reclus has calculated that only 26,000 flow out of the Black Sea. How this figure is arrived at I do not know, but I am certain we possess, at present, no means of ascertaining it accurately. The quantity of water flowing into the Black Sea is not known accurately, except for the Danube, neither do we know the rainfall on the Black Sea, still less the evaporation. All the observations on evaporation do not apply to such a case, as the conditions are very different; and if we were to admit the same evaporation from a basin of some thousands of square miles as for one of a few square inches or feet, the error would be very large. In the present state of our knowledge, a calculation like that of E. Reclus can only be accepted as a guess, which may be near the truth and may as well be very inaccurate. In no case ought it to be accepted, as Major Wood does, without any warning.

But Major Wood was satisfied with this figure of 26,000 yards, because added to the 8000 he supposes flowed from the Volga into the Sea of Azov, it makes just the 34,000 of the Bosphorus; that is the quantity which always, according to Major Wood, would flow through it, if it was all occupied by water from the Black Sea. Major Wood forgets only one thing, the slightest elevation of the waters of the Black Sea above that of Marmora would allow of a much greater flow of water through the Bosphorus, even without any enlargement of the straits. The increase in depth and in rapidity of the current would do this, and it is very likely that, when the Bosphorus did not yet exist, the level of the waters of the Black Sea was higher than now, as it was united with the Caspian.

The shores of the Bosphorus are high, and this strait could contain a very much larger quantity of water, retaining its present dimensions.

Lastly, I must say I cannot share Major Wood's robust faith in the plan of a *celebrated American engineer* for leading the waters of the Azov Sea into the Caspian, and raising its level. There are many works which are possible, but which nobody in his senses thinks of executing, because the cost is so great and the advantage relatively so small, and this scheme is just of that wild, extravagant kind. Russia has so many public works of undoubted advantage on her hands —to mention but an irrigation and navigation canal from the Amu to the Caspian, and the great Asiatic railroad to Kino, on the road travelled last year by Lozerowski's expedition—that proposals like that of Mr. Spalding must seem bad jokes to us.

I remain, Sir, yours respectfully,

A. WOEIKOF.

SINGAPORE, *June 6th*, 1876.

Proceedings of Geographical Societies.

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ROYAL GEOGRAPHICAL SOCIETY.

Meeting of June 26th, 1876.

CIRCUMNAVIGATION OF LAKE ALBERT NYANZA.

THE PRESIDENT, Sir RUTHERFORD ALCOCK, took the chair at 8.30. P.M. He reminded the Meeting that it had been lately called into question whether the Albert Nyanza was directly connected with the Nile, for the actual communication had never been traced. Thanks, however, to Colonel Gordon and the enterprise of those under him, boats conveyed several years ago by Sir Samuel Baker, and left there by him, had been launched upon the lake, and had settled the point that neither the Egyptians nor the Ptolemaic geographers, nor any succeeding nations, had been able to clear up. The Nile had now been distinctly traced into the Albert Nyanza, and that lake had been circumnavigated. When Sir Samuel Baker was upon it, he saw towards the south only a water horizon, and with the natural tendency of the human imagination to extend all that was wonderful, it had been laid down on maps as much longer than it really was; but, *en revanche*, it should be remembered that at the last meeting it was announced that Lake Nyassa stretched 100 miles farther north than was supposed, so that what was lost in one lake was gained in the other.

A letter from General Stone on the circumnavigation of the lake, the facts of which we gave in our last number, p. 191, was then read, which was followed by one received from Sir Samuel Baker, who looks upon the achievement of the circumnavigation of the lake as a great triumph for the Khedive of Eygpt that such a feat should have been accomplished during his reign; and as he (Sir Samuel) originally planned the expedition, he was truly gratified at the result, proving as it does the accuracy of the discoveries of Speke, Grant, and himself.

A letter received from the Foreign Office was also read, giving authentic intelligence of Colonel Gordon, who had penetrated as far as the banks of the Somerset River, in the district of M'rooli. He expresses a hope that, within a year or two from the present time, the means of communication between the different stations which he has established will be sufficiently secure to allow both merchants and travellers to traverse the country in safety.

The PRESIDENT said no doubt the concluding portion of the letter would appear to many to be a very sanguine estimate; but when it was considered what great things had been done within the last three or four years, even since Livingstone ended his life in the effort to open up Central Africa, how much Stanley and Cameron had accomplished, and Mr. Young was still doing on Lake Nyassa, it really seemed no dream of the imagination that within a very few years, if the necessary effort were made, it might be possible to traverse Equatorial Africa from the Congo to the Zambesi, and have stations upon each of the great seas from whence might radiate all the benefits and the blessings of the best civilisation.

Colonel J. A. GRANT said he was delighted to hear of the great success which Colonel Gordon had met with, and he knew from his own correspondence that his efforts had been untiring to get the steel boats and the steamers up to Duflé, where the cataracts of the Upper Nile cease. Although Captain Speke did not visit the Albert Nyanza, he obtained its bearings from descriptions given him by the chiefs so far south as Karagwe, and from those on the north of Victoria Nyanza, and he was thus able to lay down its position and size to within 30 or 40 miles of the truth. He could not say that he

put much confidence in M. Gessi's measurement at present, for Lieutenant Watson, who had been with Colonel Gordon, had told him that probably the rate of travelling by boat would be the only means by which M. Gessi determined the size of the lake. Colonel Gordon had now completed a chain of strong posts all along the Upper Nile from Gondokoro to the Victoria and Albert Lakes, so that now there was water communication all the way from London. He thought Captain Speke was quite right in regarding the Albert Nyanza as merely a backwater of the Nile, formed by the floodwaters from the Victoria Nyanza filling the plain and then descending in full stream to Gondokoro. That this was the case was proved by the fact that on reaching Gondokoro, two months after seeing the water in high flood at the Victoria Nyanza, Speke found that the water had not then got down so far as Gondokoro. It must therefore have been retained in the Albert Nyanza as a backwater.

Lieutenant CAMERON said he met at Nyangwe many men who had been on the Mwutan zigé (as they termed it), and from their reports he had gathered that the lake was not of such great extent as Baker had marked it on the map. The Arabs of Unyanyembe stated that after about thirty-five days' marching N.W. by N. they came to extensive forests, in which they travelled for days without seeing the sun, and there they heard of people wearing white clothing, who were, no doubt, the Egyptians working down from the north. On his maps he had pencilled down his idea of the lake from these reports, and he found that it corresponded almost exactly with Speke's description.

Captain J. S. HAY then read his paper

ON THE DISTRICT OF AKEM IN WEST AFRICA.

During the late war between the Asantis and Djaubins, in the latter part of 1875, Captain Hay received orders to take command of the field force sent up to the frontier of the British Protectorate, to prevent the neutrality of our territory being violated by the Asantis, the Djaubins having been driven to take shelter in our territory of Akem. Kyebi, the capital of Akem, he made his headquarters, and during a period of three months had ample opportunity of making himself acquainted with this hitherto almost unknown district.

The district of Akem lies between 6° and 7° N. latitude. A series of mountain ranges, densely covered with primeval forests, occupy the whole extent except a small portion of the south-east and a still smaller portion of the western part. The towns and villages are mostly situated on or near the tops of the hills. A description of one of these towns answers for all, as they scarcely vary at all in appearance. As one wends one's way through the trackless forest, no outskirts or other sign mark the approach to a scene of human life and habitation. We come upon them all at once, without the slightest notice or indication. They are hidden from sight by the primeval trees until they are actually reached. They generally consist of one long straggling street; the houses are constructed of bamboo framework, held together by wood-fibre, and thatched with palm and plaintain leaf. The side walls are plastered with mud over the framework, and very rarely have windows or apertures. They are entered by a side door, leading into a courtyard, where the culinary operations, such as they are, are performed; the rooms, which are very small and low, being distributed on the three sides of the courtyard. In the centre of the town there is generally a fetish-tree, supposed to be inhabited by the local deities; and two trees, one at each end, with rude benches or logs of wood at their feet, where the kings and chiefs hold their "palavers" and receptions.

The whole country is well watered, the principal rivers being the Berem, the Denou, the Bompong, and the Pompong, the channels of which are never dry, receiving constantly a supply of water from the mountain ranges, and being also frequently swollen by rain. Owing to the presence of numerous small waterfalls and shoals, they would only be navigable by light canoes, though these even are not used by the natives, who have no commerce, and are too indolent to create any.

The entire country of Akem is auriferous in a high degree, and is honeycombed in some parts with gold holes from 16 to 20 feet deep. The soil is a heavy, tenacious red clay; quartz strata and red sandstone cropping up in every direction. The country is rich in timber-woods, which grow to immense height and girth, some reaching to a height of a hundred feet. The forests being left in their primeval state, all cultivation is rendered impossible. The soil is very rich, and capable of growing cotton, rice, ginger, and coffee in any quantity. In spite of the sloth of the natives, the palm-tree flourishes luxuriantly, and the tobacco plant grows wild in rank luxuriance. Innumerable gum-trees are met with in the neighbourhood of Begoro, the most northerly town in the district.

The climate of Akem is throughout the year humid. During Captain Hay's stay of three months (November to January), in what is called the dry season, it rained every day, accompanied by heavy thunder and lightning.

Captain Hay next touched upon the personal appearance, habits, manners, language, and religion of the natives. The men are of medium height and slight build, but capable of undergoing great fatigue; they are incorrigibly idle, and greatly addicted to drunkenness. The women are well formed, short, and for the most part do all the work. The natives are very partial to palm-oil, taking it in the form of soup, with snails or monkey's flesh. Their ordinary dish is called "Foufou," and consists of green plantain boiled and beaten to a pulp. Of this they consume enormous quantities, after which they frequently fast for twenty-four hours.

They are, of course, polygamists, and a man is counted rich in proportion to the number of his wives. Instead of receiving a dowry from the family of the bride, the candidate pays a price to the father varying from 5*l.* to 10*l.*, in gold dust, besides "dashes" of cloth and rum. The only exception to this rule is the reigning chief of the district, who has the power to demand the daughter of any man without the customary payment. The present King of Eastern Akem has about thirty wives, but some are well-stricken in years, it being the custom when a king ascends the "stool" for him to retain the principal wives of his predecessor. A daughter of the royal family in all the tribes can propose to any man, and he cannot refuse to accept her—generally on pain of death. When a princess chooses a peasant, the latter is at once made a chief, and is, like the rest, allowed to take other wives; but if the princess conceives a dislike to any of them, she has merely to order him to send them away, and he is compelled, on pain of death, to obey. They have also the privilege of divorcing their husbands without appearing before any tribunal.

Their religion is popularly supposed to consist merely in the worship of pieces of wood and stone. They are assumed to know nothing at all about an overruling God and Creator; but long before the Christian doctrine was introduced to their country they entertained a clear and remarkably developed idea of the one supreme God, whom they hold to be the Creator and Preserver of all things, who is omnipresent in the visible firmament, which they consider as a part of his immense and boundless being. They call him *Amyankŭpong*, and they hold him to be not only the Creator of all inanimate things, but also of the invisible spirits in the air, who, as he dwells too far from man himself, are the media of communication between God and man.

EASTERN TURKISTAN.

The Assistant-Secretary then read a paper by Mr. R. B. Shaw on the geography of Eastern Turkistan, being based on an account written by Mirza Haidar, a

prince of the royal family of Kashghar, and a contemporary and connection of the Emperor Baber.

After describing the position of the mountains of Moghulistan (the Muzart and Tian-Shan ranges), the province of Farghâna (Andijan or Khokand), Badakshan and Pâmir, he arrives in his description at a region where Balor is conterminous with the mountainous districts of Raskam and Tâghdumbâsh. He also speaks of the mountains between Khotan and the cities of India as ending in Khataï, a remark which shows that he possessed the rare quality among Orientals of being able to generalise. He looks upon the mountain region encompassing Kashgaria on the north, west and south, as one great mass, and then ingeniously gauges the width of the chain by giving us lines across it in different parts, these being routes radiating from the cities of Eastern Turkistan.

The first route, he says, leads from Kashghar to Farghâna, and crosses the Alai, which is narrower than the Pamir. Concerning this route, Mr. Shaw observes that it seems to be identical with the Tau-Murun and Shart passes, which are situated to the west of the Terek or main route between Khokand and Kashghar. Mirza Haidar mentions another route up the valley of Shahnaz, leading from Kashghar across the western mountains to Badakhshân. He then refers to the drainage of the cultivated region skirting the eastern slope of the western mountains, and describes it as a month's journey in length from the borders of Kashghar to the extremity of Khotan, and as one or two day's journey in breadth. By the side of every river issuing from the mountains corn is sown and the land inhabited. One peculiar feature of these streams is, that many of them which are many miles apart at the point of crossing are derived from a single trunk-stream higher up. Captain Biddulph, in the interesting account of his visit to Maralbashi, corroborates this feature. The natural rivers of the country seem thus to have disappeared or become merged in the number of artificial watercourses or canals, into which they have been distributed by the industry of the children of the soil. We thus find that instead of the streams diminishing in number and increasing in volume as we follow them downwards, it is the reverse that takes place, there being complexity below and unity above. This seems to be due in the first place to the curious "alluvial fan" formation, which has been graphically described by Mr. F. Drew, F.G.S., in a paper read before the Geological Society in August, 1873, and which is common in Tibet, where it can be studied with greater ease than in the present region. Mr. Shaw remarks that as one leaves Kizil and travels towards Kok-Rabat, the skirts of the mountains are nearer the road, and the desert slopes down from the low outer hills on the right, this curious feature may be seen in the form of a series of "fan" formations. For example, after leaving a certain ruined Chinese post-house, situated in one of the triangular flats between the fan edges (near Aklangar), one ascends the slope of a fan which is seen to issue from a remarkable ravine-cutting in a low range of outer hills to the south-west, and after traversing this fan undulation for seven miles, one reaches the bottom of another trough, which is distinctly seen to proceed from the same cutting, so that the two post-houses, though seven miles apart, must have been supplied with water radiating from the same spot.

Having traced up most of the water flowing through the country between Kashghar and Yarkand into four or five main trunks, radiating in deltas or fans, Mr. Shaw observes of these that the Kashghar river derives its chief supply from the combined Terek and Alai streams; the Yaman-yar may possibly be distinct from the Kashghar river; the Shahnaz probably proceeds from the great valley or opening in the mountains almost due south of Yangi Hissar, by which the Pamir, and thence Wakhan and Badakhshan, may be gained. Regarding the intermediate system or systems, the Kuzun and the Tazghun, Mr. Shaw is of opinion that one of them has its origin in an opening between the two culminating peaks to the west and south-west of Yangi Hissar, which are probably nearly 20,000 feet high each. Behind them (he was informed) lies the smaller Karakul lake, and its outflow, if any, would join the Tashbalik river.

Mr. Shaw thinks that the mountains on the east of the Pamir plateau should be considered not as a range lying roughly north and south, and cut through by the rivers, but rather as a series of more or less parallel ridges, whose direction is roughly east and west, and between which the eastward drainage of the Pamir escapes. This would be in harmony with the lie of the ridges bounding the Alai, as seen by Fedtchenko, and also with those traced by Colonel Gordon's party on the north of Kashghar, where the southward flow of the streams does not prevent the ridges from running east and west.

Mirza Haidar's next gauge line leads from Yarkand to Badakhshan. Balor is here mentioned, and then Tibet. From this and another passage it is clear that Balor corresponds to Dardistan.

In noticing the route from Yarkand to Kashmir, Mr. Shaw draws special attention to the fact that the valley by which one approaches the Karakoram Pass (judging both from native information and his own observation) turns round to the north-west and then again to the north, and joins the Yarkand River at Kufalung. Thus it would seem that one can ride across on a level from sources that feed the Indus into others that join the Yarkand River. If so, the Karakoram has no *locus standi* left, and it resolves itself into a little ridge, having neither physical connection with the mighty Muztak Range nor any geographical importance whatever.

After a few words from the President on the political and geographical importance of the paper, Lord LAWRENCE remarked that from a military point of view he thought our Indian Empire had very little to fear from that side of Asia, owing to the wide extent of lofty mountainous country that intervened. If ever the British and the Russians encountered each other in the neighbourhood of India, it would be rather on the western side, towards Khorassan and Mash-had. He, however, trusted that that day was far distant. There was room enough for the employment of both nations to engage themselves in peaceful work in Asia for many generations without coming into contact, and if he were a Russian instead of an Englishman, he should strongly advise his countrymen to rest content with what they had in Central Asia, and what they might still get at a comparatively cheap cost, and not to break their heads against the British power in India.

Colonel MONTGOMERIE said Mirza Haidar appeared to give a very correct account of the mountains in and around Kashghar, and his remarks as to the Pamir, and the Alai, and the route across the Khokand were exceedingly valuable even at the present day. In the twelfth century Marco Polo crossed from Badakhshan over the Pamir to Kashghar, but from that time to the days of Mirza Haidar no information was obtainable about those regions Since this latter period, with the exception of the account given by the Jesuit missionaries, nothing had been learned with respect to the district till quite recently, and it was not even known how Marco Polo made his way from Badakhshan to Kashghar in preference to Yarkand. This difficulty arose from a mistake in the earlier maps, which placed Yarkand very much further to the west than its true position. From the time of the Jesuits nothing was heard of those regions till Moorcroft, in 1834, sent Trebeck from Leh to Kashghar. From that time to 1861, when he first had the honour under Lord Lawrence of initiating the explorations by natives, the subject was dropped; but in 1863 they at last succeeded in fixing the position of Yarkand by means of the journey of Muhammad Amin, and in 1864 and 1865

Mr. Johnson made his way to Ilchi. From that date our knowledge of the country had increased almost as rapidly as our knowledge of Africa had done. Still, it was only the immediate neighbourhood of the lines of route that anything was known about, and we were still ignorant of what became of the great river that runs past Yarkand at a rapid rate. It might run into a great lake, or disappear in the Desert of Gobi. All that was known was that it did not reach the sea. There was also a very large tract away to the east about which nothing was known. He agreed with Lord Lawrence that the 400 miles of mountains, on an average over 15,000 feet high, presented an impenetrable barrier to a modern army. The only army that ever crossed it went from the Indian side, and it never came back again. The surveys in which he had been engaged extended only to the frontier, but the whole of the supplies of the surveying parties had to be carried on the backs of sheep, and when the food was eaten they ate the sheep. Every one in India, however, was curious to know what lies behind the snowy peaks that were seen from the plains. Since our occupation it had only been crossed in two places, by Hooker and one or two others near Darjeeling, and by Johnson, Shaw, Hayward, and the late missions near Ladak. Until his agents made their way to Kinglo, literally nothing was known of what lies beyond. It was now known that there was a series of four districts running along at the back of the mountains and coming out to the north of Lhassa, utterly desert, and only inhabited by a few nomads who picked up sufficient grass for their flocks. It was quite incapable of supplying any commercial traffic of value, and it was not worth the while of the Indian Government to run any risk for anything that was to be got on that side. In the interests of geography, however, it was most desirable to have more complete knowledge of those 1500 miles of mountains. There was a very large tract of country lying between India and China, about which nothing was yet known. Quite recently, one of his explorers extended his journey from Kinglo to a point on the Tengri Nur Lake north of Lhassa, returning through Assam to Calcutta, but he did not come across any rich country which would give any hope of a profitable connection with that part of the world.

The PRESIDENT, in conclusion, announced that the council had that day approved of a scheme for the promotion of the more scientific branches of geography. Amongst other things, lectures by eminent men of science on various subjects in physical and general geography would be given. Details of the scheme would be furnished in the last number of the Society's *Proceedings* for the Session.

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PARIS GEOGRAPHICAL SOCIETY.

June 7th, 1867.—M. MALTE BRUN in the chair:—The Minister of Foreign Affairs communicated a letter to the Society which contained the latest information on Colonel Gordon's operations on the Upper Nile. The Secretary, M. Maunoir, then read a letter which had been received from M. SAVORGNAN DE BRAZZA, who is exploring the Ogowé. M. de Brazza left Sam Quita on the 18th January, with nine canoes. Dr. Ballay, unfortunately, had to be left behind on account of the state of his health. On the second day after his departure, M. de Brazza himself fell ill; and was unable to continue his scientific observations. On the 22nd he joined M. Marche at Sangalati (Okata), where he had been detained from want of men. The Bakalai had deserted him, and the Okata were determined that he should not proceed any further. In the end, however, by threatening to burn their village, M. Marche succeeded in getting rowers, and he was thus able to rejoin his fellow-travellers, who had gone in advance, and on the 10th of February both travellers arrived at Lope (Okanda), where they learnt that Dr. Lenz had gone to the country of the Simba.

A report on the visit to the monasteries in the Eastern Desert of Egypt, by Drs. SCHWEINFURTH and GUSSFELDT, was then read.

M. DE WATTEVILLE, of the Ministry of Public Education, reminded the Society that the commissioners of the leading European Governments present at the late Geographical Congress had agreed to recommend to their Governments an exchange of all official geographical publications. The Minister of Education was disposed to give effect to this recommendation.

Dr. HAMY announced that during a recent journey to the west of France he had discovered a valuable MS. by Lesueur, the naturalist, of Baudin's expeditions, and an unpublished paper on New Caledonia by Dr. Desplanches, abounding in ethnological and zoological information.

M. HAYAUX DU TILLY then read a paper on the African lake region and the sources of the Nile, dwelling more especially upon the exploratory work done by the brothers Poncet.

June 21st, 1876.—M. MALTE BRUN in the chair. M. J. SAINT-SUPERY announced that he would shortly depart for Venezuela, where he proposed to reside for ten years, and that he proposed to explore the country with reference to its commercial and agricultural capabilities. M. MEURAND communicated an analysis of a blue book, on the Island Tristan d'Acunha, recently presented to Parliament. That island had now a population of fourteen families, most of them descended from Corporal Glass and two sailors, who stayed behind on the withdrawal of the garrison after the death of the Emperor Napoleon in 1821.

The secretary announced that M. Logerot had founded a prize of 20*l*., to be awarded every two years to geographical writers or explorers.

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ITALIAN GEOGRAPHICAL SOCIETY.

June 18th, 1876.—Signor CORRENTI in the chair. The President communicated the results of Captain Roudairé's exploration of the Tunisian Shotts, from which the formation of an inland sea to the south of Algeria appeared to be feasible. The Italian explorers had arrived at a different conclusion, but he should be glad to find that they were mistaken, and that this grand project was capable of realization.

Professor UZIELLI then read two letters from M. de Brazza, and explained how he discovered the manuscripts of Count Annibal Ranuzzi of Bologna, the author of the first Italian Geographical Yearbook and the founder of a Geographical Institute.

NOTICE.

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Census of British Isles, 1871.
MIGRATION
compared with
LOCAL ELEMENT
OF POPULATION.
Emigration and Local Element below Average.
Emigration below Average, Local Element above it.
Emigration above Average, Local Element below it.
Emigration and Local Element above Average.
SHETLAND ISLANDS
CHANNEL ISLANDS
Guernsey
Jersey
FRANCE
ORKNEY IS
SUTHERLAND
INVERNESS
ABERDEEN
FORFAR
PERTH
KINCARDINE
Aberdeen
Montrose
Arbroath
Perth
Kirkcaldy
Dunfermline
Glasgow
Ayr
Dumfries
Carlisle
Newcastle
Tynemouth
Shields
Sunderland
Durham
Middlesbrough
CUMBERLAND
NORTHUMBERLAND
DURHAM
YORKSHIRE
York
Leeds
Bradford
Halifax
Huddersfield
Manchester
Sheffield
Liverpool
Lancaster
Barrow
I. of MAN
Preston
Bolton
Chester
CHESHIRE
Lincoln
LINCOLN
NOTTS
Derby
Nottingham
Boston
Norwich
Yarmouth
NORFOLK
Leicester
STAFFORD
SALOP
Coventry
NORTHAMPTON
Bury St Edmunds
SUFFOLK
Cambridge
Ely
Oxford
Colchester
ESSEX
HERTS
BUCKS
BERKS
Reading
Bristol
Bath
WILTS
SURREY
Maidstone
Canterbury
KENT
HANTS
Winchester
Southampton
Portsmouth
SUSSEX
Brighton
SOMERSET
DEVON
Exeter
DORSET
CORNWALL
Plymouth
Swansea
GLOUCESTER
BRECON
RADNOR
HEREFORD
MONTGOM.
DENBIGH
FLINT
CARNARVON
MERIONETH
ANGLESEY
CARDIGAN
CARMARTHEN
PEMBROKE
Aberystwith
Worcester
Warwick
Birmingham
Stratford
Banbury
Aylesbury
Hertford
Chelmsford
Brighton
Dover
Ramsgate
Margate
Hastings
Rochester
Gravesend
Greenwich
Deptford
Woolwich
Croydon
Kingston
Guildford
Reigate
Dorking
Epsom
Windsor
Slough
Eton
Henley
Wycombe
Oxford
Abingdon
Wantage
Newbury
Basingstoke
Andover
Salisbury
Devizes
Chippenham
Trowbridge
Frome
Wells
Taunton
Bridgwater
Yeovil
Dorchester
Weymouth
Poole
Bournemouth
Ringwood
Lymington
Newport
Ryde
Cowes
Isle of Wight
Isle of Man
Douglas
Peel
Ramsey
Castletown
Port Erin
Port St Mary
Laxey
Onchan
Douglas
Belfast
Londonderry
DONEGAL
ANTRIM
TYRONE
DERRY
DOWN
ARMAGH
MONAGHAN
CAVAN
LOUTH
Drogheda
SLIGO
LEITRIM
MAYO
ROSCOMMON
LONGFORD
WESTMEATH
GALWAY
Galway
KING'S
QUEEN'S
KILDARE
WICKLOW
Dublin
CLARE
Limerick
LIMERICK
TIPPERARY
CARLOW
KILKENNY
WEXFORD
KERRY
Waterford
CORK
Cork
Aberystwith
Swansea
Cardiff
Newport
Bristol
Gloucester
Worcester
Hereford
Shrewsbury
Stafford
Derby
Nottingham
Leicester
Lincoln
Boston
Norwich
Yarmouth
Ipswich
Colchester
Chelmsford
Cambridge
Ely
Bury St Edmunds
Oxford
Reading
Maidstone
Canterbury
Dover
Brighton
Portsmouth
Southampton
Winchester
Salisbury
Exeter
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LIMERICK
TIPPERARY
CARLOW
KILKENNY
WEXFORD
KERRY
Waterford
CORK
Cork

SHETLAND ISLANDS
SUTHERLAND
ROSS & CROMARTY
Inverness
INVERNESS
Perth
Ayr
Londonderry
DONEGAL
ANTRIM
Belfast
TYRONE
FERMANAGH
ARMAGH
DOWN
SLIGO
LEITRIM
MONAGHAN
MAYO
CAVAN
LOUTH
Drogheda
ROSCOMMON
LONGFORD
WESTMEATH
MEATH
GALWAY
Galway
KING'S
Dublin
KILDARE
QUEEN'S
WICKLOW
CLARE
Limerick
CARLOW
Kilkenny
LIMERICK
TIPPERARY
WEXFORD
KERRY
Waterford
CORK
Cork
CHANNEL ISLANDS
Guernsey
FRANCE
Jersey
CORNWALL
10°
8°
6°
4°
2°
60°
58°
56°
54°
52°

Census of British Isles, 1871.
INCREASE OR DECREASE
OF POPULATION.
1861-1871.
Decrease 5 & more p. Cent.
Decrease 0 - 5
Increase 0 - 5
Increase 5 - 10
Increase 10 - 15
Increase 15 - 20
Increase 20 - 25
Increase 25 - 30
Increase over 30
ORKNEY
CAITHNESS
Aberdeen
Montrose
Arbroath
Dundee
Perth
Kirkcaldy
Berwick
Hawick
Dumfries
Tynemouth
Shields
Sunderland
Middlesborough
YORKSHIRE
York
Leeds
Liverpool
Manchester
Sheffield
Norwich
NORFOLK
Yarmouth
Chichester
Brighton
Portsmouth
Salisbury
Bristol
Reading
Canterbury
KENT
SUSSEX
FRANCE
4°
2°
0°
2°
2°
0°
2°
58
56
54
52
50